Washington State Department of Transportation

Washington State TRUCK PARKING STUDY

December 2016

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Summary

As the most trade dependent state per capita in the U.S., the efficient transport of goods is essential to Washington's economy. With 64.3 percent of freight in Washington transported by truck, it is crucial that drivers have safe and available parking options to support economic competitiveness. A survey of the national highway system, required by the federal 2012 Jason's Law, found Washington has some of the most severe truck parking challenges in the nation.

The Washington State Department of Transportation (WSDOT) is working to better understand and address truck parking issues across the state. WSDOT initiated this 2016 Truck Parking Study to better understand and address truck parking and rest facility issues within the state. This study builds upon WSDOT's previous truck parking efforts from 2005 and 2008, and incorporates recent events and federal activities.

SCOPE

The types of truck parking considered in this study include ten-hour rest breaks, thirty-minute rest breaks, urban local delivery parking, truck storage and incident-based truck parking. In this study, WSDOT identifies key industry stakeholders, best practices from other states, factors influencing parking demand, truck parking supply and capacity, key truck parking issues and concerns, opportunities for improvements and next steps to continue truck parking efforts. WSDOT also surveyed drivers in the state, and held multiple roundtable discussions and interviews of industry participants, to fully understand the issues drivers face.

THE STATE OF FREIGHT AND TRUCK PARKING

There are 14 high-volume truck freight economic corridors in Washington state, each carrying at least four million tons of freight each year. Washington's economy is growing rapidly and freight is growing along with it; the state's truck freight volume by weight is forecasted to grow 65 percent between 2015 and 2045, at an average annual growth rate of 1.7 percent. Continued growth in truck traffic volume is expected to put more pressure on current truck parking facilities. The American Transportation Research Institute (ATRI) named two Washington cities, Seattle and Auburn, in the top 25 most congested freight locations in the U.S.[1] Both cities experience significant freight bottlenecks and increased demand for parking. Washington also has five international border crossings, two of which the U.S. Department of Transportation (USDOT) lists in the top 15 international border crossings with the slowest speeds. Congestion and slow border crossings decrease the productivity of truck drivers within their hours-of-service regulations, subsequently affecting demand for parking. Industry changes, such as just-in-time logistics, operational costs and driver detention, all have significant effects on truck parking demand. State and federal regulations can also influence demand, such as insurance requirements and hours-of-service protocols.

[1] http://atri-online.org/2015/11/18/congestion-impact-analysis-of-freight-significant-highway-locations-2015/ (November 2015)

METHODOLOGY AND OUTREACH

WSDOT engaged the trucking community throughout the development of this study, using tools such as an online survey, roundtable discussions and one-on-one interviews. The online survey received 1,118 responses, 84 percent of which were from truck drivers. WSDOT published the full survey results online as well as a summary of the survey highlights.[2] Beyond the survey, WSDOT conducted five roundtable truck parking discussions in the cities of Tukwila, Tacoma, North Bend, Vancouver and Seattle. Truck drivers, trucking company representatives and port and government officials attended. Roundtable participants voiced concerns on many issues, including the upcoming electronic logging device mandate, disputes over responsibility for providing parking, their willingness to pay for parking, methods of communicating parking information, locations with disproportionate parking demand and environmental effects of truck parking.

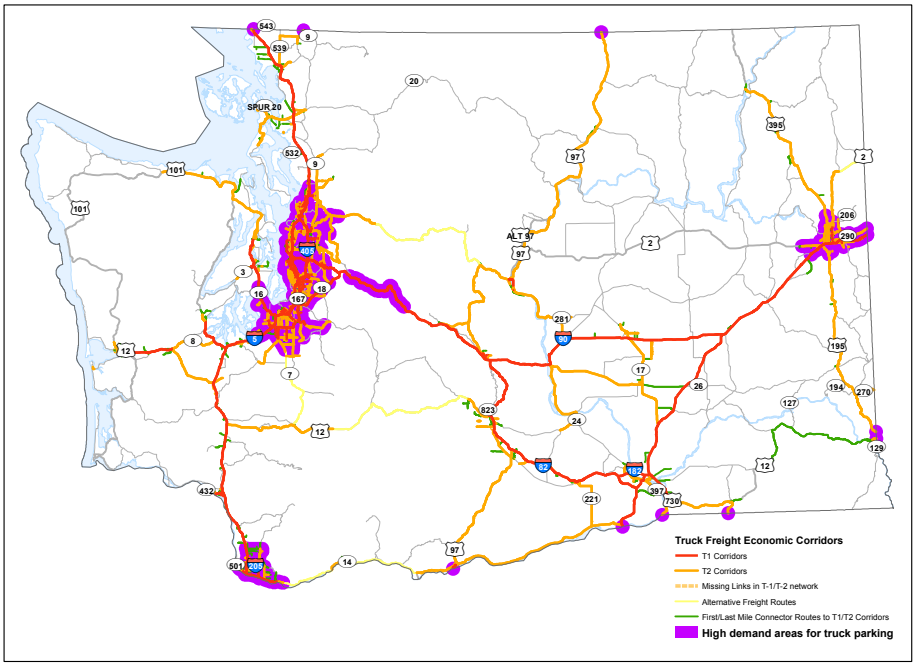
WSDOT also reached out to regional WSDOT offices to gain a better understanding of how truck parking needs differ across the state. Each region had its own specific concerns, including issues with unofficial truck parking, overcrowding at safety rest areas and community and environmental concerns. Truck parking has other associated concerns related to safety, community and environmental issues. For example, insufficient truck parking may be a factor in truck crashes related to fatigued driving or unofficial parking. Drivers also said property damage, cargo theft and personal harm are all concerns related to lack of safe parking. Communities also listed concerns about the safety ramifications of locating parking facilities near their neighborhoods. Environmental concerns, especially related to truck idling emissions, are another common truck parking issue.

KEY FINDINGS

Based on extensive outreach and engagement efforts, WSDOT identified key truck parking issues in Washington. Safety issues related to inadequate truck parking are a major concern; 46 percent of WSDOT survey respondents said they frequently drive fatigued as a result of insufficient parking. In addition, 59 percent of drivers frequently do not feel safe while parked overnight in Washington. WSDOT's truck parking survey also found that Washington's top three corridors with unmet parking demand are Interstate 5, Interstate 405 and Interstate 90. WSDOT found that parking issues are the most prevalent in urban areas, and at border crossings and mountain passes. WSDOT also determined that drivers' parking preferences do not always match

[2] http://www.wsdot.wa.gov/Freight/truckparking.htm

Figure 1: High demand areas for truck parking on Truck Freight Economic Corridors



with actual use. For example, highway exit and entrance ramps are one of drivers' least preferred parking options but are third most used. The truck parking shortage in Washington is likely getting worse, with demand increasing and supply potentially decreasing. Other key truck parking issues include trucking industry concerns, environmental effects, infrastructure constraints and communication and coordination needs.

OPPORTUNITIES

WSDOT has identified several opportunities for truck parking enhancement, including infrastructure enhancements, institutional resources, and funding sources. These opportunities can be explored as a means of addressing truck parking concerns, particularly in locations with high truck parking demand. Infrastructure enhancements include emerging technologies, such as real-time parking availability systems, and innovative supply expansion options in both the private and public sector. Institutional opportunities enhance understanding of the state of truck parking through data gathering and research, as well as through the formation and continuation of key partnerships. Finally, identifying financial opportunities allows stakeholders to identify and pursue potential funding sources to enhance truck parking. For example, the Federal Fixing America's Surface Transportation (FAST) Act, USDOT Transportation Investment Generating Economic Recovery (TIGER) grants and the Diesel Emissions Reduction Act (DERA) can all potentially be used to fund truck parking projects. There are also opportunities for truck parking to pay for itself. Both private and public entities can make investments in truck parking facilities that can be maintained through truck parking fees or other revenue.

STATEWIDE TRUCK PARKING MAP

In order to help drivers and dispatchers locate parking options in Washington, WSDOT created a printable truck parking map. The map lists private truck stops, safety rest areas and weigh stations in Washington, as well as their corresponding amenities. The map, including any updates, is available on WSDOT's website.[3]

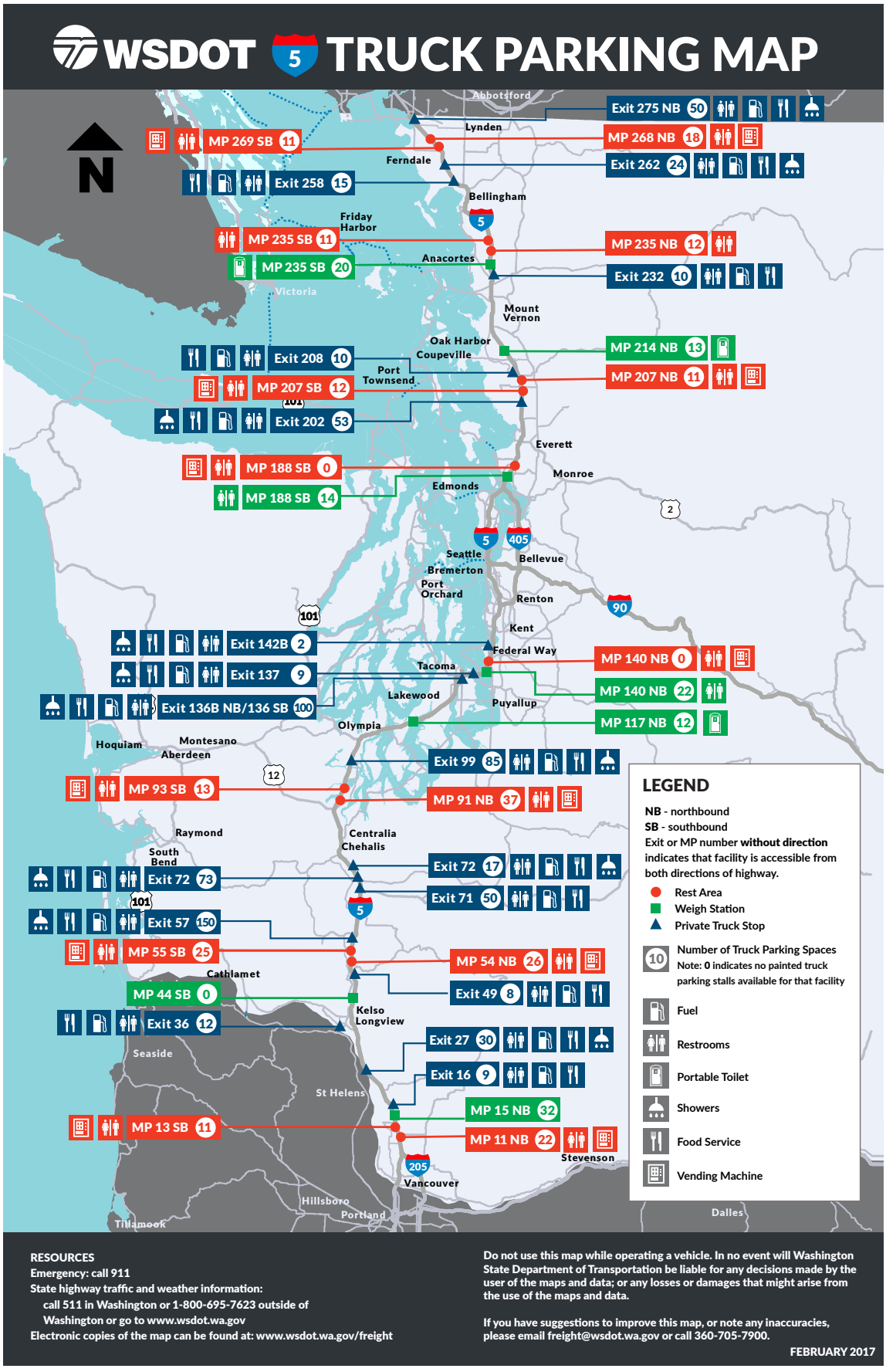
NEXT STEPS

Truck parking will continue to be an issue in Washington and additional efforts will be needed beyond the scope of this study. No one entity can address this growing concern alone and it will take strong partnerships to meet this truck parking challenge.

WSDOT will incorporate the research collected for this study into its 2017 Freight Mobility Plan. In the future, WSDOT will continue current partnerships and establish new partnerships with state, federal and other public entities, industry associations, researchers and local communities to enhance understanding and work toward truck parking solutions.

[3] http://www.wsdot.wa.gov/Freight/truckparking.htm

Figure 2: Truck Parking Map



1 Introduction

This study assesses the state's capability to provide adequate truck parking and rest facilities. This work builds upon WSDOT's previous truck parking efforts from 2005 and 2008, and incorporates recent events and federal activities. In 2012, the U.S. Congress passed Jason's Law to address the shortage of truck parking on the National Highway System. Previous WSDOT studies, as well as the Federal Highway Administration's (FHWA) Jason's Law Truck Parking Survey Results and Comparative Analysis, found Washington has significant deficiencies in truck parking. Recent closures of truck parking facilities and rising levels of truck traffic volume indicate that the truck parking problem is getting worse. The shortage of convenient and available truck parking in Washington is a concern for safety and economic competitiveness, and has disproportionate effects on urban areas and other key locations in the state.

Washington state is the most trade dependent state per capita in the U.S. Trade relies on the safe and efficient movement of goods, making trucks important to Washington state's economic competitiveness. Each year, trucks move more freight than other modes such as rail, marine, pipelines and aviation, whether measured by tonnage or value. When measured by tonnage, trucks moved 64.3 percent of all freight into, out of, within and through Washington; by value, trucks moved 59.0 percent of all freight.[4] Without trucks, freight would not be able to be moved from rail yards, ports, pipeline terminals and airports to their final destinations. It is therefore important that the trucking industry have the resources to operate effectively within Washington, which includes access to adequate truck parking.

Truck parking is a statewide problem that will grow in intensity over time, due to projected growth of truck traffic on the highway system. Truck drivers are required to take rest breaks, both by state and federal regulations, in order to ensure that drivers get adequate rest and to promote safety. Truck parking availability directly relates to roadway safety for truck drivers and the general travelling public, as drivers unable to find safe and legal truck parking may park in unofficial parking locations or continue to drive past their allowed hours. Economically, insufficient truck parking can affect the state by increasing shipping times and costs, thus making Washington's businesses less competitive. Nationally, the estimated economic cost of 83 percent of drivers requiring 30 minutes to find parking is $7 billion annually.[5] Truck parking also has generated community concerns including air and noise pollution, and a fear of increase in crime. In this study, WSDOT explores these issues, amongst other truck parking concerns.

Truck parking needs are diverse and can vary greatly based on location, demand, time of day, road and weather conditions and other factors. Just as truck parking needs in urban areas are different from those in rural locations, long-haul drivers largely have different parking needs than short-haul drivers. The following general types of parking are addressed throughout the study in the context of demand and supply factors:

[4] http://faf.ornl.gov/fafweb/Extraction0.aspx

[5] http://www.maasto.net/documents/TPIMS-Grant.pdf (page 3)

- **Ten-hour rest breaks**
  This type of parking is needed and/or desired by drivers. A 10-hour break is mandated by federal law, commonly taken at night. Overnight parking is more commonly required for regional or long-haul drivers

- **Thirty-minute rest breaks**
  This type of parking is needed and/or desired by drivers. Thirty-minute rest breaks are mandated by federal law and are commonly taken during the day

- **Urban local delivery parking**
  This type of parking is the result of route deliveries with usually numerous stops in areas, sometimes without designated areas for parking

- **Truck storage**
  This type of parking is the result of a truck not having a permanent place to reside after work hours

- **Incident-based truck parking**
  This type of parking refers to unplanned parking with little or no notice, often due to weather, traffic or other incidents

Given the multitude of needs, truck parking is a responsibility shared among various public entities and private sector partners. These groups work separately and in partnership to provide truck parking facilities and services across the state. No one entity can solve the diverse issues related to truck parking. Solutions to inadequate truck parking will require collaboration and efforts from a variety of stakeholders. In the private sector, namely the trucking industry, truck drivers, truck stop owners, freight carriers and other private businesses all play key roles in responding to the demand for truck parking. Several associations represent and support the trucking industry on key issues, including the industry shortage of truck parking. In the public sector, agencies on both a national and local level are involved in truck parking. Federal agencies have identified truck parking as a national concern and have taken steps to address it. In Washington, WSDOT, as well as cities, counties, tribes and other local agencies, all have roles to play in responding to truck parking needs. For further discussion of roles and responsibilities related to truck parking in the state, see Appendix A.

WSDOT developed this study in consideration of Results Washington, the statewide performance management initiative. WSDOT's work on truck parking contributes to Goal 2: Prosperous Economy by improving travel and freight reliability on strategic corridors. This work also supports Results WSDOT Goal 2: Modal Integration and Goal 5: Community Engagement. Results WSDOT provides the vision, mission, values, goals, priority outcomes, and strategies to guide the work of the agency.

A. TRUCK PARKING EFFORTS AT THE NATIONAL LEVEL

Truck parking is a national problem. In 2012, Congress passed Jason's Law, which brought national attention to the issue of truck driver safety and required USDOT to survey each state's truck parking system. In response, the Federal Highway Administration published Jason's Law Truck Parking Survey Results and Comparative Analysis in 2015, which found Washington is one of the states with the most severe truck parking challenges. The issues and needs identified in FHWA's report were the basis for developing this updated state truck parking study.

Also, at the national level, ATRI, part of the American Trucking Association (ATA), administers an annual survey of trucking industry experts. In the 2016 survey results, respondents listed truck parking as the fourth issue with the highest level of concern. ATRI is also developing several research reports on truck parking. Further discussion of FHWA and ATRI's surveys can be found in Appendix B.

B. WSDOT'S TRUCK PARKING ACTIVITIES

This study is a follow-on activity to WSDOT's previous truck parking activities from 2005 and 2008. WSDOT's 2005 Truck

Parking Study[6] evaluated the adequacy of truck parking along the Interstate 5, Interstate 90, and Interstate 82 corridors, which are the primary freight corridors in Washington. The study determined:

- Safety rest areas exceeded capacity by 8 percent, and truck stops were underutilized by 13 percent
- Truck parking demand for Interstate 5 and Interstate 82 would increase by 3.5 percent annually, and 4 percent annually for Interstate 90
- With no additional truck parking provided, Interstate 5 truck parking will be at 326 percent capacity, Interstate 90 West at 321 percent capacity, and Interstate 90 East at 255 percent capacity by 2030

In response to the 2005 Truck Parking Study, WSDOT's 2008 Truck Parking Survey[7] focused on how truck drivers and trucking companies view the adequacy and availability of truck parking and services along primary freight corridors in Washington. The survey found:

- Truck stops and safety rest areas were overcrowded and too far apart
- Ninety-five percent of drivers who responded to the survey said overcrowding was a major barrier to parking
- Seattle, Tacoma, and Federal Way, all of which are on the Interstate 5 corridor, were most in need of additional parking spaces
- The majority of truck drivers and companies were unwilling to pay for parking and only about half of drivers were willing to use a parking reservation system
- Sixty-two percent of surveyed drivers said they use some form of idle reduction technology, the most popular option being auxiliary power units/ generators

WSDOT has acted on some of the strategies identified in the 2005 and 2008 truck parking studies. WSDOT added additional capacity at Scatter Creek, a safety rest area with high demand, as budget and space constraints allowed. However, in other locations, WSDOT has decreased truck parking capacity due to safety concerns and to allow for prioritized projects. WSDOT also assessed the willingness of several jurisdictions to provide truck parking and found that some cities have severely limited truck parking, while others allow parking in designated areas. WSDOT has used the Freight Alert[8] email service to communicate to truck drivers about truck parking. Finally, the 2014 Washington State Freight Mobility Plan[9] identified truck parking as an issue and developed a strategy to identify funding sources to add parking capacity in high-demand locations along Truck Freight Economic Corridors. WSDOT's designation of Truck Freight Economic Corridors has been essential in understanding truck parking as it relates to truck traffic. Additional information on WSDOT's previous truck parking activities can be found in Appendix C.

C. TRUCK PARKING EFFORTS IN OTHER STATES

Many truck drivers in Washington travel across state lines, making the work of other states very relevant to WSDOT's analysis. While each state has its own specific circumstances affecting truck parking, there are common issues across the country. To better understand how other states are approaching the issue, WSDOT reviewed recent studies completed by nine states; as well as studies conducted by a port and one Canadian province.

The studies varied in their focus, but there were some common

[6] http://www.wsdot.wa.gov/NR/rdonlyres/90A1F589-BB16-48E5-A958-6337018F2912/0/WSDOTTruckParkingStudyFinalReport.pdf

[7] http://www.wsdot.wa.gov/NR/rdonlyres/F0029FBD-55C5-4A3E-8485-A88153AB09BC/0/WSDOTTruckParkingSurveyApril2008_web.pdf

[8] http://www.wsdot.wa.gov/Freight/default.htm

[9] https://www.wsdot.wa.gov/NR/rdonlyres/4AB1DCDE-5C29-4F08-B5E7-697F432C34D7/0/2014WashingtonStateFreightMobilityPlan.pdf

themes. Most states evaluated ways of providing real-time information about parking availability to drivers. Variable message signs along the highway were the most frequently preferred means of providing this information, often in concert with other tools. Multiple states also looked at increasing truck parking capacity by using existing facilities, such as weigh stations and park and rides. Several states also looked at providing financial incentives, like tax benefits or low-interest loans, to encourage development of more truck parking capacity by the private sector. A more detailed summary of our findings is in Appendix D.

2 Truck Freight Economic Corridors

Movement of freight relies on highways and roads for long-distance transport as well as for local delivery. In 2014, WSDOT designated Truck Freight Economic Corridors,[10] which were developed and established in partnership with the Washington's Freight Mobility Strategic Investment Board (FMSIB), Metropolitan Planning Organizations (MPOs), Regional Transportation Planning Organizations (RTPOs), counties, cities, ports and tribal governments.

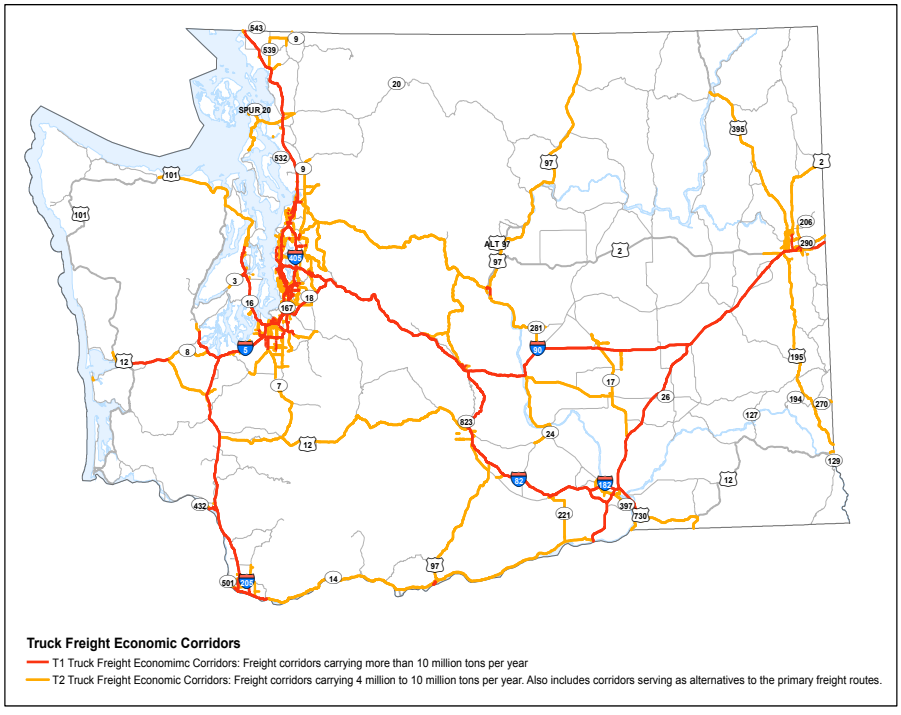
The main high volume Truck Freight Economic Corridors are defined by annual tonnage based on Washington State Freight and Goods Transportation Systems,[11] and include all T-1 (carrying more than 10 million tons per year) and T-2 (carrying 4 to 10 million tons per year) corridors in the state. Truck Freight Economic Corridors recognize the importance of system resiliency (alternate routes to primary cross-state freight routes during severe weather or other disruptions) and supply chains (first/last mile connections to freight intensive land uses). The Truck Freight Economic Corridors also include first/last mile connector routes serving significant intermodal facilities, agricultural processing centers, warehouse districts or other freight intensive land uses.

WSDOT uses the Truck Freight Economic Corridors to identify and map supply chains, identify system condition and capacity issues and to develop performance measures to improve freight mobility. In the 2016 Truck Parking Survey, WSDOT used Truck Freight Economic Corridors to better understand where the trucking industry most encounters truck parking issues. The T-1 and T-2 routes were included in the survey to assess respondents' perceptions of truck parking availability along these corridors.

A map showing these corridors is included. These corridors are:

- Interstate 5
- Interstate 405
- Interstate 82
- Interstate 90
- US Highway 2
- US Highway 12
- US Highway 97
- US Highway 195
- US Highway 395
- State Route 14
- State Route 16
- State Route 18
- State Route 26
- State Route 167

Figure 3: Truck Freight Economic Corridors in Washington



[10] http://www.wsdot.wa.gov/Freight/EconCorridors.htm

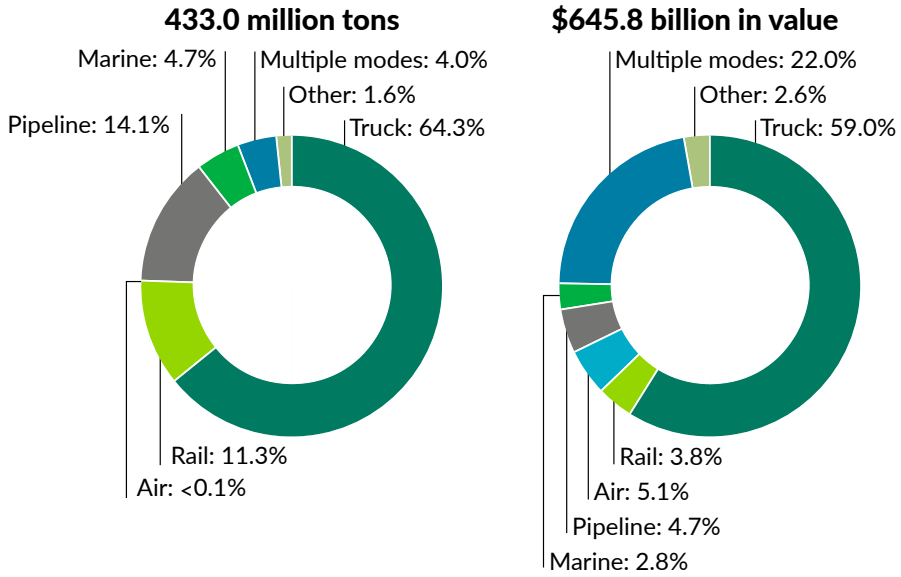
[11] http://www.wsdot.wa.gov/Freight/FGTS/

3 Demand Factors

As documented by FHWA in the Jason's Law survey, most other states provide higher ratios of public to private truck parking than Washington. In addition, FHWA asked the Commercial Vehicle Safety Alliance (CVSA) and Owner Operator Independent Drivers Association (OOIDA) members to identify states that have parking issues. Among all the states, Washington was 12th in terms of number of CVSA mentions of illegal parking and 10th in terms of OOIDA mentions of parking problems. It is evident; therefore, that demand for truck parking already exceeds supply in Washington. As demand increases, existing truck parking shortages will worsen if additional truck parking is not provided.

Demand for truck parking varies depending on the type of parking and is related to several factors, primarily growing freight transportation demand and increasing use of trucks as the predominant mode of freight transportation. In addition, increasing congestion on major truck routes, delays at international borders and at shipping/receiving locations and federal and state regulations drive a higher demand for truck parking. These issues, and other factors that affect truck parking demand, are described below.

Most freight moves by truck, pipeline or rail in Washington state
2015; Percentages determined by tons and value



Data source: Freight Analysis Framework Data, Federal Highway Administration
Notes: Percentages may not add to 100 due to rounding.

A. FREIGHT ACTIVITY

Freight transportation demand is growing steadily in the United States. Freight volume by weight is forecasted to grow 40 percent between 2015 and 2045, at an average annual growth rate of 1.1 percent. Projections of steady economic growth (the economy doubling in size by 2045) and population growth (an additional 68 million people by 2045) will drive this increase in freight transportation demand.

Washington's economy is growing rapidly. On a per capita basis, Washington is the most trade dependent state in the nation (followed by Texas and Louisiana) with total imports and exports valued at $137.5 billion in 2015. Between 2012 and 2015, Washington state's share of U.S. total imports increased from 2.1 percent to 2.3 percent, and the state's share of U.S. total exports increased from 4.9 percent to 5.7 percent.[12] Trade growth

[12] https://www.census.gov/foreign-trade/statistics/state/index.html

contributes to increased freight activity. Increases in Washington's truck traffic are primarily due to a growing economy and reduced container port activity in Portland, Oregon, which has increased use of Washington's ports. Truck traffic increases in the south Puget Sound area have subsequently added to the demand for truck parking on these key economic corridors.

Trucks move the majority of freight in Washington, whether measured by tonnage or value. When measured by tonnage, trucks moved 284.8 million tons of freight into, out of, within, and through Washington in 2015, accounting for 64.3 percent of all freight shipments.[13] By value, trucks moved $381.2 billion of freight, accounting for 59.0 percent across all freight modes. Trucks tend to move more freight shorter distances and support other freight modes such as rail, marine, pipeline and air by moving goods between modes.

Lower value bulk freight traveling greater distances (such as grain) is typically carried by rail, marine and pipeline. Higher value freight (such as machinery and electronics) is primarily shipped by trucks, aircraft and marine containerized freight. However, trucks also move goods between freight modes to and from primary destinations (commonly referred to as first and last mile). Due to this increasing reliance on trucks to transport freight, demand for truck parking has increased.

Figure 4: Trucks line up to cross Snoqualmie Pass

According to FHWA FAF4 data, total freight shipment by weight is expected to increase 53 percent between 2015 and 2045 in Washington state. Truck freight tonnage is projected to increase to 471 million tons in 2045, a 65 percent increase, at an average annual growth rate of 1.7 percent. The value of truck freight shipments is projected to grow 2.4 percent annually.

B. TRUCK TRAFFIC VOLUME

In addition to commodity information, WSDOT also analyzed truck traffic on the highway system. Interstate 5 is the state's most important north-south interstate corridor, supporting Washington's trade with the rest of the U.S., Canada and Asia, and serves freight intermodal hubs, warehouse districts and major population centers. The south Puget Sound area saw increasing truck traffic volume on Interstate 5 from 2014 to 2015. In Olympia (milepost 107), daily truck traffic volume increased 7.4 percent from 12,249 trucks in 2014 to 13,158 in 2015. During that same time in Tacoma (milepost 131), where the state's highest daily truck activity occurs, truck traffic volume increased 3.7 percent from 15,226 to 15,793 trucks. In 2015, average daily truck traffic volume was 9,168 trucks at the Interstate 5 Columbia River Crossing (on the border between Washington and Oregon) and 2,327 trucks at the State Route 543 interchange near the Canadian border crossing.

Interstate 90 is the main highway for east-west commerce in Washington state. On Interstate 90, average daily truck volume increased from 6,275 to 6,548 trucks in North Bend (milepost 33) and from 3,413 to 3,495 trucks in Vantage (milepost 136) from 2014 to 2015. The segment includes Snoqualmie Pass, one of the most travelled mountain passes by trucks in the world. On State Route 18, volume increased

[13] Freight Analysis Framework Data Tabulation Tool (FAF4), http://faf.ornl.gov/fafweb/Extraction1.aspx

from 5,064 to 5,317 trucks in Auburn (milepost 5) and from 3,689 to 3,853 in Snoqualmie (milepost 27).[14] The average daily truck traffic volume is calculated as the volume of truck traffic for an average day (24-hour period) during a data reporting year. Truck volume data is collected from vehicle classification counters or estimated based on truck percentage and total traffic volume.

The ATA estimates that truckload volumes will increase two percent each year between 2016 and 2022. After 2022, that forecast holds steady at 1.6 percent per year until 2027.[15] WSDOT's previous truck parking work estimates that the annual increase in truck parking demand on Interstate 5 and Interstate 82 is 3.5 percent and 4 percent on Interstate 90. An increase in truck traffic likely will result in increased demand for truck parking. There are many factors that relate to truck traffic volume and truck parking demand in Washington, some of which are discussed below in further detail.

I. Truck Freight Delays

Truck freight delays affect truck traffic and parking demand. Of the top 25 most congested freight-significant locations in the U.S.,[16] ATRI identified two locations in Washington state based on 2013 data. ATRI listed Seattle (Interstate 5 at Interstate 90) as 20th with a peak period average speed of 29 mph and a non-peak period average speed of 42 mph. ATRI listed Auburn (SR 18 at SR 167) as 24th with a peak period average speed of 42 mph and a non-peak period average speed of 51 mph. Such bottlenecks affect the productivity of a driver within their maximum hours-of-service restrictions. As bottlenecks worsen, and cause greater delay, demand for parking near these locations will increase as drivers account for the variability in their schedules.

At the international border, the number of freight trucks crossing from Canada into Washington increased 3.2 percent from 2014 to 2015.[17] USDOT identifies two locations in Washington in the top 15 international border crossings with the slowest speeds in the U.S. The wait time at the Pacific Highway crossing in Blaine is sixth worst in the U.S.,[18] where the average time for commercial vehicles to travel one mile is 6.7 minutes inbound to the U.S., and 4.5 minutes outbound to Canada. The wait time at Sumas is 11th worst in the U.S.,[19] where the average time for commercial vehicles to travel one mile is 3.8 minutes inbound, and 3.7 minutes outbound. These bottlenecks not only affect the productivity of the driver, but also increase demand for truck parking concentrated at the international border.

II. Just-in-Time Logistics

Just-in-time logistics is an inventory strategy employed by businesses to increase efficiency and decrease waste by receiving goods only as they are needed in the production process. There are several advantages to this strategy, including reducing costs by eliminating waste, including warehouse storage. The

[14] Truck volume data on the state highway system is collected and compiled by WSDOT Transportation Data, GIS & Modeling Office.

[15] http://www.trucking.org/article/Latest-U.S.-Freight-Transportation-Forecast-Shows-Continued-Growth-for-Trucking

[16] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf (page 55)

[17] http://wsdot.wa.gov/publications/fulltext/graynotebook/Jun16.pdf (page 39)

[18] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf, page 62)

[19] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf (page 62)

disadvantages of this strategy, however, are that supply chain disruptions can increase costs, such as wasted time if a truck arrives late for delivery. Just-in-time logistics may increase truck traffic by inducing more frequent truck trips, adding to overall congestion and parking demand. Therefore, an increase in truck parking demand can be expected near major shippers, receivers, and ports as truck drivers attempt to meet their tightly scheduled delivery times. In the just-in-time marketplace, consistent and reliable travel time estimation directly affects the bottom line of freight dependent industries; when a lack of available truck parking occurs, the supply chains in Washington are affected.

III. Operational Costs

Operational costs, which include both vehicle-based and driver-based costs, have a direct effect on truck parking. The average marginal cost per mile in the trucking industry has been steadily increasing from 2008 to 2014. However, from 2014 to 2015, the average marginal cost per mile decreased by 11 percent for the for-hire sector of the trucking industry.[20] When operational costs are lower, trucks become a more attractive option for shipping, leading to an increase of truck traffic and a subsequent increase in parking demand. The majority of this decrease in operational cost is attributed to falling diesel prices, which decreased by 31 percent between 2014 and 2015.[21] Driver wages, on the other hand, increased by 8 percent in the same time period,[22] likely due to the growing shortage of truck drivers and to offset lost productivity due to traffic congestion and regulations.[23] Drivers, particularly those on long-haul routes, usually are paid by the mile. This sort of compensation structure can also affect parking demand as it incentivizes drivers to drive as far as they can within their hours-of-service, even if it means parking in an unofficial location.

IV. Freight Insurance Requirements

The Federal Motor Carrier Safety Administration (FMCSA) requires all truck drivers to have public liability insurance ranging from $750,000 to $5 million, in order to protect owner-operators and trucking companies against liability for injury or damage to another party in the event of a crash or other incident.[24] FMCSA requires some, but not all drivers, to have cargo insurance to protect against damage and theft. Most carriers will require that the owner-operator or company hauling their goods have cargo insurance.[25] In most cases, trucking companies are liable for the full value of the goods they are transporting.[26] Drivers may elect to purchase cargo insurance, or a variety of other insurance coverages, independently in order to protect themselves, their truck and their load.

A growing number of businesses require truck drivers to insure their cargo. Freight insurance provides protection against risks of physical loss or damage to freight from external causes during shipping. Across the United States and Canada, 124 tractors and 139 trailers were reported stolen in second-quarter 2016 alone.[27] Insuring freight is an important way to manage the financial effect of loss or damage. Some provisions of freight insurance contracts include a requirement that trucks park in legal truck parking locations. This increases demand for legal truck parking options, such as truck stops and safety rest areas.

V. Driver Detention

Driver and truck detention occurs when a shipping or receiving location holds the truck and driver until loading can be completed. A recent survey found that most drivers spend three to four hours waiting to get

[20] http://atri-online.org/wp-content/uploads/2016/10/ATRI-Operational-Costs-of-Trucking-2016-09-2016.pdf (page 30)

[21] http://atri-online.org/wp-content/uploads/2016/10/ATRI-Operational-Costs-of-Trucking-2016-09-2016.pdf page 28)

[22] http://atri-online.org/wp-content/uploads/2016/10/ATRI-Operational-Costs-of-Trucking-2016-09-2016.pdf (page 28)

[23] http://atri-online.org/wp-content/uploads/2016/10/ATRI-Operational-Costs-of-Trucking-2016-09-2016.pdf (page 27)

[24] https://www.fmcsa.dot.gov/registration/insurance-requirements

[25] http://www.truckinsure.com/pros3.htm

[26] http://ntassoc.com/Loading_and_Unloading_-_Who_is_Responsible.aspx

[27] http://www.truckinginfo.com/channel/fleet-management/news/story/2016/08/cargo-thefts- decline-average-loss-increases.aspx

loaded or unloaded per stop.[28] In many cases of detention, the driver must remain in the truck, ready to move, as the shipping/receiving dock becomes available, or when the queue through a gate advances. This is distinctly different from parking a truck in a traditional sense, where the truck is in a parked position for an extended period of time, and the driver has the opportunity to rest. Some shippers/receivers will allow the driver to disconnect with the trailer while in detention, which provides a rest break for the driver.

The Seattle Department of Transportation (SDOT) reports that, at the Port of Seattle, the average turn time for 63 percent of drivers is one to two hours, although 60 percent had, on occasion, spent over four hours at the terminal.[29] Shippers and carriers have adopted a punitive approach to discourage detention by requiring a shipper pay the carrier or truck driver a fee. Detention fees can range from $30 to $60 per hour after the driver has been detained for more than two hours. To reduce driver detention, the Port of Vancouver, British Columbia is implementing a single point of entry and reservation system that connects trucking companies with container terminal operators. This system enhances predictability for shippers, trucking companies, and for drivers.[30]

The USDOT Office of Inspector General began, in June 2016, collecting data about the effects of detention time at shipper and receiver docks on the trucking industry, as directed by the FAST Act section 5501. This audit will assess how delays affect the economy; the efficiency of the transportation system; motor carrier safety, including the extent to which delays result in violations of motor carrier safety regulations; and the livelihood of motor carrier drivers. The report will include recommendations on how delays could be mitigated.

Detention time causes delays to a driver's schedule and lost wages. In addition, detention can lead to safety issues, as truck drivers may attempt to make up for this lost time by driving faster or operating beyond their on-duty hours-of-service limits. Furthermore, carriers and drivers often miss an opportunity for their next load when their truck is detained at a shipper/receiver location for multiple hours. This creates demand for parking because detention reduces the available number of hours a driver can operate; due to detention, drivers may miss their next pick-up window and thus need to park while they wait for a new appointment.

C. HOURS-OF-SERVICE REGULATIONS

ATRI ranked federal hours-of-service regulations as the top trucking industry issue in 2015, for the third consecutive year, following their annual survey of industry experts.[31] Required rest breaks contribute to the demand for truck parking. Drivers are required to rest for short-term and long-term breaks, creating a need to park trucks so the driver can meet federal and state mandates for rest. Federal and state regulations limit when and how truck drivers can be on-duty and driving. These limitations are designed to prevent truck drivers from becoming fatigued while driving, and require drivers to take a work break and have a sufficient off-duty rest period before returning to on-duty or driving status. Drivers are also required to conduct a pre- and post-trip vehicle inspection, which cannot be done during a rest break, further limiting their driving hours.

To abide by hours-of-service regulations, drivers will often leave time in their schedule to look for parking. Because the time required to look for parking can vary greatly based on time of day and location, drivers may leave a time "buffer", which can result in unused, unproductive driving time. Research from ATRI shows that most (39.9 percent)

[28] http://www.dat.com/blog/post/54-of-Drivers-Are-Detained-3-4-Hours-Per-Stop

[29] http://res.cloudinary.com/sagacity/image/upload/v1445358106/T18_Bathroom_Study_-_Final_July_2015_r6fzuq.pdf

[30] http://www.portvancouver.com/truck-rail/truck/smart-fleet-trucking-strategy/

[31] http://atri-online.org/wp-content/uploads/2015/10/ATRI-2015-Top-Industry-Issues-FINAL-10-2015.pdf

drivers have 31 to 60 minutes of drive time remaining when they park, time that could be used more productively. On average, the loss of revenue from unused driving time is equal to $4,600 per year, effectively reducing a driver's average annual wage by 10 percent.[32] Access to better parking options, or more information regarding parking availability, would likely allow drivers to make better use of their drive time without working beyond their hours-of-service limits.

Truck drivers must follow the hours-of-service regulations[33] if they operate a commercial motor vehicle (CMV). The federal regulations define a commercial motor vehicle as vehicle used in commerce that has a gross vehicle weight rating or gross combination weight rating, or gross vehicle weight or gross combination weight, of 10,001 pounds or more, whichever is greater, or if it is transporting hazardous materials in a quantity requiring placards. The nature of the trip defines whether federal or state regulations apply. In general, drivers engaging in interstate commerce are required to follow federal hours-of-service regulations,[34] while drivers engaging in intrastate commerce are required to follow state regulations.[35] These differences are described below.

I. Federal Hours-Of-Service Regulations

Federal safety regulations limit the number of hours drivers can drive commercial motor vehicles and the number of hours drivers can drive CMVs after being on-duty. Part 395 of the Federal Motor Carrier Safety Regulations[36] defines the

[32] http://campaign.r20.constantcontact.com/render?m=1104335014579&ca=41b4cace-ad36-4428-ab4a-16f582927c7f

[33] https://www.fmcsa.dot.gov/regulations/hours-of-service

[34] https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/Drivers%20Guide%20to%20HOS%202015_508.pdf

[35] http://www.dol.wa.gov/driverslicense/docs/cdlguide.pdf (page 1-28)

[36] https://www.fmcsa.dot.gov/regulations/title49/part/395

Table 1: Hours-of-Service for Commercial Drivers

Rules and Regulations	Federal or State Law	Description	Applicability
14-Hour Driving Window	Federal	Drivers may work for 14 consecutive hours after being off-duty for 10 or more consecutive hours.	Both Interstate and Intrastate Freight
11-Hour Driving Limit	Federal	Drivers may drive 11 hours during their 14-consecutive-hour period.	Both Interstate and Intrastate Freight
60/70-Hour Duty Limits	Federal	Drivers cannot drive after being on-duty for 60 hours during a seven-day work week or 70 hours for an eight-day work week.	Both Interstate and Intrastate Freight
30-Minute Rest Break	Federal	If more than eight consecutive hours have passed since the last off-duty period, the driver must take an off-duty rest of at least 30 minutes.	Both Interstate and Intrastate Freight
10-Minute Rest Breaks	Washington state	Employers are required to provide a 10-minute paid rest break for every four hours of work time.	Intrastate Freight Only
30-Minute Meal Period	Washington state	Employers must provide a 30-minute meal period for every five hours of work.	Intrastate Freight Only
16-Hour Property Carrying Exception	Washington state	A property-carrying commercial vehicle may extend the 14-hour on-duty period by 2 hours once every seven days, with some exceptions.	Intrastate Freight Only

hours-of-service rules for truck drivers. Interstate commerce, for which federal regulations apply, occurs when the shipper intends to have freight transported to or through another state or country. This is considered interstate commerce from the moment it leaves the shipper until it arrives at its destination. In this situation, even if the truck hauls the freight only within a single state, the transportation is considered interstate commerce. The hours-of-service regulations focus on when and how long drivers are allowed to drive by placing specific limits on the amount of time a driver can drive after being on-duty. Drivers must follow three maximum duty limits at all times: the 14-hour "driving window" limit; the 11-hour driving limit; and the 60-hour/7-day and 70-hour/8-day duty limits. These limits are explained below.

14-Hour Driving Window

Drivers are allowed a period of 14 consecutive hours in which they can drive up to 11 hours after being off-duty for 10 or more consecutive hours. The 14-consecutive-hour driving window begins when a driver starts any kind of work. Once a driver has reached the end of this 14-consecutive-hour period, they cannot drive again until they have been off-duty for another 10 consecutive hours, or the equivalent of at least 10 consecutive hours off-duty. Driving is limited to within the 14-consecutive-hour period even if the driver takes some off-duty time, such as a lunch break or a nap, during those 14 hours.

11-Hour Driving Limit

During the 14-consecutive-hour period explained above, drivers are only allowed to drive a truck for up to 11 total cumulative hours. Driving is not permitted if more than eight hours have passed since the end of the driver's last off-duty or sleeper-berth period of at least 30 minutes. Once a driver has driven a total of 11 hours, they have reached the driving limit and must stop driving and then have 10 consecutive hours off-duty or in the sleeper berth (or equivalent) before driving again.

60/70-Hour Duty Limits

The 60/70-hour limit is based on a seven- or eight-day period for the start of a 24-hour period. This limit is sometimes thought of as a "weekly" limit. However, this limit is based on a "rolling" or "floating" seven-day or eight-day period. Drivers are required to follow one of these two limits:

1. If a company or independent owner/operator does not operate vehicles every day of the week, drivers are not allowed to drive a commercial motor vehicle after being on-duty 60 hours during any seven consecutive days. Drivers cannot drive after being on-duty 60 hours, and on-duty time includes driving and non-driving work. Once the 60-hour limit is reached, drivers will not be able to drive a commercial motor vehicle again until they have dropped below 60 hours for a seven-consecutive-day period. Drivers may do other work, but they cannot do any more driving until they are off-duty enough days to get below the limit.
2. If a company or independent owner/operator does operate vehicles every day of the week, they may assign drivers to the 70-hour/eight-day schedule. This means that drivers are not allowed to drive a commercial motor vehicle after being on-duty 70 hours in any eight consecutive days. Once drivers reach the 70-hour limit, they will not be able to drive again until they have dropped below 70 hours for an eight-consecutive-day period. Drivers may do other work, but cannot do any more driving until they get below the limit.

Thirty-Minute Rest Break

The hours-of-service regulations require that if more than eight consecutive hours have passed since the last off-duty (or sleeper-berth) period of at least 30 minutes, a driver must take an off-duty break of at least 30 minutes again before driving. Because of this short break provision, drivers are able to work 13.5 hours in the 14-hour period (if they are driving after the eighth hour on-duty).

II. Washington State's Hours-Of-Service Regulations

Intrastate commerce covers freight transportation that remains, or the services that occur, within Washington state. The federal hours-of-service rules listed above apply only when drivers are engaging in interstate commerce. Local delivery, port drayage and other in-state carriers must comply with state regulations for hours-of-service and rest breaks. All drivers of commercial vehicles must maintain either a log book or a time card.

To maintain consistency, the Washington State Patrol (WSP) adopts the federal hours-of-service regulations for intrastate drivers.[37] For the 11-hour rule, drivers are allowed to drive for 11 hours following 10 consecutive hours off-duty. For the 14-hour rule, a motor carrier cannot permit or require a driver to drive after the 14th hour after coming on-duty following 10 consecutive hours off-duty. The state also has a 16-hour exception where a property-carrying commercial motor vehicle driver may extend the 14-hour on-duty period by two additional hours. This can only occur once every seven days, and only if they meet these criteria:

- been released from duty at their normal work reporting location for the previous five duty tours,
- are released from duty at their normal work reporting location within 16 hours after coming on-duty following 10 consecutive hours off-duty, and
- have not taken this exemption within the previous six consecutive days, except following a 34-hour restart of a seven/eight-day period.

Drivers not engaging in interstate commerce are also required to follow state meal and rest break regulations.[38] Washington Administrative Code section 296-126-092 requires employers to provide a 10-minute paid rest break for every four hours of work time. Rest breaks should be scheduled as near as possible to the midpoint of the four-hour work period, and employees cannot be required to work more than three hours without a paid rest break.

This regulation also requires employers to provide a 30-minute meal period to employees for every five hours of work, between the second and fifth working hour. An additional 30-minute meal is required to be provided when employees work three or more hours longer than a normal work day. This is consistent with federal regulations.

III. Reporting and Tracking Hours-of-Service

The hours-of-service rules create demand for parking and complexities for drivers and enforcement. Beginning in 1938, truck drivers and fleets tracked hours-of-service logbooks with pencil and paper.[39] The FMCSA enforced the use of the logbook, which contained records recorded by truck drivers who detailed their activities over the course of 24 hours. According to the log book rules, truck drivers and fleets must keep track of their location and time spent on and off-duty.

Figure 5: E-Log Plus App

Due to the complexity of log book keeping, many drivers and fleets in the 1990s began using automatic onboard recording devices, an electronic logging technology, to reduce paperwork. These devices automatically record a driver's duty status and any changes in status, as

[37] http://www.wsp.wa.gov/traveler/docs/cvd/cfr395sum.pdf

[38] http://app.leg.wa.gov/wac/default.aspx?cite=296-126-092

[39] https://www.fmcsa.dot.gov/newsroom/electronic-logging-devices-be-required-across-commercial-truck-and-bus-industries

well as the amount of time they operate the vehicle. Despite this capability, many drivers and fleets, especially smaller companies and independent owner/operators, still maintain paper logs. Newer trucks integrate technology to track hours, and over time, more trucks on the road will have this capability.

In December 2015, FMCSA published a requirement for interstate commercial vehicle drivers to use Electronic Logging Devices (ELDs) in their vehicles.[40] An ELD automatically records driving time by monitoring engine hours, vehicle movement, miles driven and location information. ELD's also monitor pre- and post-trip vehicle inspections. The ELD mandate requires commercial truck drivers who currently use paper logbooks to adopt ELDs by December 2017. Motor carriers who have previously installed automatic onboard recording devices may continue to use the devices until December 2019. Eighty-five percent of drivers who participated in ATRI's Truck Parking Diaries already use some form of an ELD.[41] Approximately three million drivers are expected to be affected by this new requirement. In addition, the mandate sets technology specifications detailing performance and design requirements for ELDs so that manufacturers are able to produce compliant devices; smart phones and other wireless devices are permitted to be used as ELDs, if they interact with hardware installed in the vehicle. This new regulation, and its impending effects on drivers, propelled the ELD mandate to the number one issue of most concern on ATRI's 2016 survey, with hours-of-service requirements coming in second place.[42]

WSP will adopt the same reporting requirements for intrastate drivers, as per Washington Administrative Code 446-65-010(1)(u), which adopts Part 395 of the Federal Motor Carrier Safety Regulations—Hours-of-Service for Drivers. Drivers operating exclusively in Washington must therefore adopt the same ELD service monitoring requirements on the same timeline, with limited exceptions.[43]

The ELD mandate has the potential to significantly affect parking demand. Drivers will no longer be able to drive past their hours-of-service in order to find parking. Although this practice is already illegal, some drivers have been known to drive in excess of their hours if necessary to find safe, available and legal parking. For example, logbooks record time in 15-minute increments, while ELDs record time up to the minute. With the new ELDs, drivers may feel more obligated to stop driving when their hours run out, no matter where they are at the time, due to the ease of tracking violations. This could help to spread out parking locations, reducing congestion at overcrowded rest areas and truck stops. However, this may also increase the prevalence of unofficial parking, as drivers park on the nearest exit or entrance ramp or in an abandoned lot to ensure they don't operate in excess of their hours. Overall, this new mandate will require greater planning on the part of truck drivers and more communication between drivers, dispatchers and parking providers, to ensure drivers are able to locate safe parking and still abide by the hours-of-service regulations.

[40] https://www.gpo.gov/fdsys/pkg/FR-2015-12-16/pdf/2015-31336.pdf

[41] ATRI Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries (2016)

[42] http://atri-online.org/2016/10/03/critical-issues-in-the-trucking-industry-2016-update/

[43] http://app.leg.wa.gov/wac/default.aspx?cite=446-65-010

4 Supply and Capacity

A. PRIVATE TRUCK PARKING

Truck drivers park, both legally and unofficially, on privately owned land. The private sector contributes to truck parking supply primarily in the form of truck stops, but also at some private businesses and at shipper and receiver locations. Some of these locations charge for parking, while others simply recognize the economic benefit of trucks and allow drivers to park for free. Unofficial parking also occurs on private land where truck parking is not authorized, such as in vacant lots, private businesses and near shippers and receivers.

I. Truck Stops

A truck stop is a commercial facility that provides fuel, restrooms and space for truck parking, sometimes for a fee. Truck stops are the private sector's response to perceived demand for parking. Many truck stops have additional amenities such as ready-made food or restaurants, showers and lounges/game rooms. Some larger truck stops also provide truck maintenance, such as lube and oil changes, tire replacements and truck wash stations. A few may even employ on-site mechanics; offer Wi-Fi; have mailing services; and supply movie rentals. Major truck stop chains have begun to offer reservation services for their parking spaces and customer loyalty programs, often partnering with a trucking company to reward repeat patronage. For example, TA/Petro and Pilot/Flying J, two major truck stop chains, offer parking reservations starting at 4 p.m.

According to the Jason's Law survey, most of the available truck parking is provided by these privately owned facilities. The survey estimates there are more than 300,000 truck parking spaces in the U.S., with more than 272,000 of those at private truck stops.[44] Many surveys have reported that drivers prefer private truck stops as a parking option for both short and long-term (overnight) breaks. WSDOT's 2016 Truck Parking Survey shows that, the number one preference for truck parking locations were private truck stops for short-term parking (32 percent) and for overnight parking (36 percent). This preference is likely due to the increased amenities and security offered at some private truck stops.

WSDOT is aware of 49 truck stops in Washington that have space for truck parking,

[44] Jason's Law Truck Parking Survey Results and Comparative Analysis 2015 (page x)

Figure 6: Donna's Truck Stop in Marysville, WA

collectively providing 2,442 spaces. Most of these truck stops are located along major truck routes, such as Interstate 5, Interstate 90 and Interstate 82, although there are no truck stops around the Seattle metro region. Truck stops range in size from providing just one or two parking spaces, to over 200. See WSDOT's truck parking map for more detail.[45]

The trucking industry suffered considerably during the recent recession, leading to the closures of many truck stops. Even now that the economy is recovering, some truck stop owners and operators find it difficult to sustain profitable operations. Competition for prime land for redevelopment has caused truck stops to close. Additionally, local communities sometimes use land use and zoning tools to relocate truck stops when their location is desired for alternative purposes. Some communities in Washington restrict the growth of truck stops, prevent the construction of new truck stops or pass ordinances that require a commercial parking tax.[46] Truck stops function best when located near heavily traveled highways. These locations are prime for many other businesses as well, who will pay considerably for the truck stop's land, or will outbid truck stops on land purchases.

Several of Washington's private truck stops have closed their doors in recent years. In 2008, the Broadway/Flying J Truck Stop in Federal Way closed when the area was developed into a retail center. Located at the corner of Interstate 5 and State Route 18, this truck stop was ideally located to serve the needs of drivers. Another example of a recently closed truck stop is the Restover truck stop in Tumwater. Restover, also located on the busy Interstate 5 corridor, had room for approximately 50 trucks to park. After being annexed by the city of Tumwater, the property was bought by the Chehalis Confederated Tribes in 2014. Future plans for development of this property are unknown at this time.[47] On the other hand, a new Love's Travel Stop is scheduled to open in Prosser on Interstate 82 in early 2017. This will be the first Love's on Interstate 82 and should help meet growing demand for truck parking, including growing demand from Washington's wine industry, and alleviate pressure on the neighboring safety rest area.

The new travel stop will include a store, fuel, a fast-food restaurant, a hotel, a tire repair center and, of course, parking. The travel stop alone is anticipated to generate 40 to 50 jobs[48] and will help respond to parking demand on Interstate 82, one of Washington's key freight corridors.

II. Private Parking Lots

Businesses

Some retail locations (e.g., Wal-Mart, Home Depot) allow truck parking in the car parking lots, especially after hours. Other locations, such as casinos, also attract truck drivers and recreational vehicle (RV) users. Several mobile device apps are available to direct drivers to these locations. Many truck drivers park in these locations whether it is legal or unofficial and whether it is encouraged or discouraged by the business. These locations are typically well lit and easy to find. They typically are located near other businesses, where drivers can find food and restrooms, therefore making them appealing parking locations for drivers. Some private businesses often cite liability concerns as a reason for not providing truck parking; others seem to recognize the economic benefits of trucks and their drivers and allow them to park on their property. The ability of businesses to provide truck parking may vary based on individual city laws. There are anecdotal reports of private businesses charging for truck parking, although typically these locations are free.

Vacant and Abandoned Lots

When unable to park at official truck parking facilities, drivers may decide to park in vacant lots or clearings on privately owned land. These locations are not usually paved and do not have

[45] http://www.wsdot.wa.gov/Freight/truckparking.htm

[46] http://app.leg.wa.gov/rcw/default.aspx?cite=82.80.030

[47] http://www.ci.tumwater.wa.us/home/showdocument?id=9076 (page 11)

[48] https://www.tricitiesbusinessnews.com/2016/05/13/loves-coming-prosser-bringing-couple-friends/

any basic amenities for drivers. Truck stop owners have been able to successfully develop truck parking facilities on undeveloped land, responding to the need for truck parking and storage. Vacant lots also include parking lots abandoned by an industrial, commercial or office business, which may become attractive to truck drivers. These locations are typically paved, but do not have basic amenities. Whether vacant or abandoned, many of these locations are not documented and it is therefore difficult to assess supply of and demand for these lots.

III. Shipper and Receiver Locations

Truck parking availability at the starting and ending locations of trips is critically important. In many cases, however, parking is not provided at shipping and receiving locations. Of those locations that do provide parking, it is typically for company trucks, and outside truckers are not allowed to park there, even for a fee. Companies are concerned with losing their competitive advantage and proprietary business practices if a competitor is allowed to park on their property. Shippers and receivers also have expressed liability concerns with trucks and drivers on their property, along with the usual concerns about waste and crime. On the other hand, some companies do not provide parking simply because their building takes up too much of their parcel. Locations near major shippers and receivers often see high demand for truck parking as truck drivers wait to drop off or pick up their load, leading to pressure on neighboring truck parking facilities and on local communities.

B. PUBLIC TRUCK PARKING

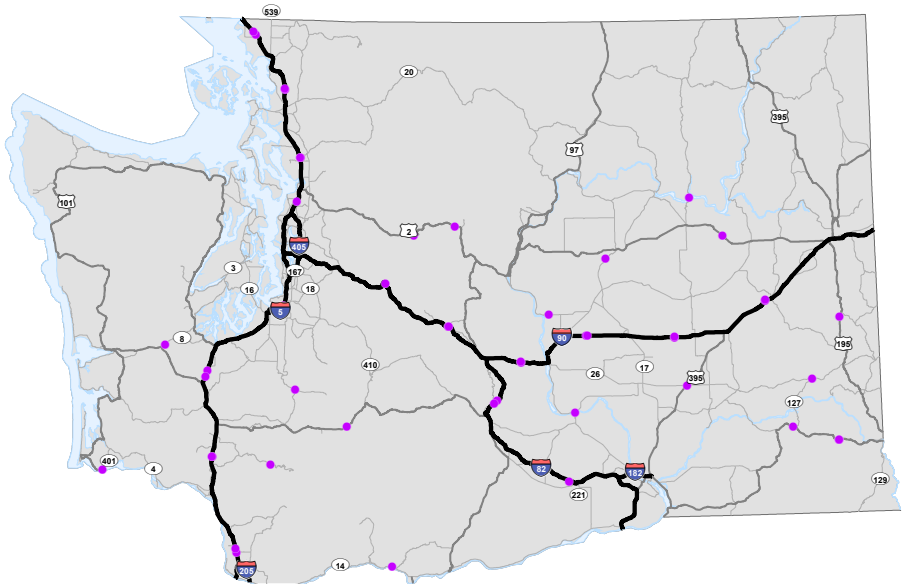
The public sector also provides truck parking sites and other solutions, recognizing the safety and economic concerns caused by inadequate truck parking. Washington provides free truck parking at safety rest areas and weigh stations. Some cities and counties allow for truck parking in designated locations on city streets, usually with specified time frames. In addition, some public ports, or their tenants, provide long or short-term truck parking for trucks.

I. Safety Rest Areas

WSDOT owns and operates the 47 safety rest areas in Washington. They contribute to improved safety on Washington's highways by providing the traveling public with opportunities to take a break from driving.[49] The rest areas are located approximately 30 to 45 miles apart to be consistent with the Federal Highway Administration's recommended spacing guidelines of a rest area every 60 minutes of drive time on highways and major arterials. WSDOT safety rest areas provide 536 truck parking stalls. Most locations are open 24 hours a day, seven days a week.[50]

Safety rest areas provide several benefits to truck drivers such as

Figure 7: Safety Rest Areas in Washington



[49] http://wsdot.wa.gov/publications/fulltext/graynotebook/Mar13.pdf#page=16

[50] http://www.wsdot.wa.gov/Safety/RestAreas/

restrooms, vending machines, picnic areas and safe resting locations. WSDOT's Truck Parking Survey found safety rest areas are a preferred stopping location for drivers, second only to truck stops. Safety rest areas contribute to improved highway safety by providing fatigued or distracted drivers a chance to stop. Breaks interrupt what could be a 14-hour work day for truck drivers, reducing the potential of fatigued decision-making or drivers falling asleep behind the wheel.

Truck parking is provided at all 27 safety rest areas on Washington's Interstate Highway System, and at 14 of 20 locations on state routes. Annual visitor use is much greater at the Interstate Highway System sites, which are heavily used by commercial truck drivers. Figure 7 shows the rest areas providing truck parking. WSDOT provides an online safety rest area map.[51]

2008 Safety Rest Area Strategic Plan

In 2008, WSDOT completed a Safety Rest Area Strategic Plan. The plan identified truck parking capacity as an issue that should be improved at safety rest areas when funding is available. The plan identified additional locations for truck parking at weigh stations and opportunities to provide parking through public-private partnerships. The plan states that minimal improvements on a site could greatly benefit the trucking industry, such as gravel or paved parking areas with vault toilets. Key findings of the plan include:

- Safety rest areas alone were never intended and will never be sufficient to meet the truck parking demand
- There are safety and circulation concerns with buses that stop at safety rest areas that utilize the truck parking area and the growing number of trucks utilizing non-designated parking areas
- State and federal regulations restrict the ability to provide electrification systems at safety rest areas

Key recommendations from the plan include:

- Identify opportunities at existing safety rest areas for site expansion to accommodate additional truck parking
- Pursue federal funding to support future truck parking projects at safety rest areas
- Pursue funding to implement an Intelligent Transportation System (ITS), initially at Interstate safety rest areas and then further evaluate the need at non-interstate safety rest areas
- Provide information on alternative truck parking locations on the safety rest area website and at rest areas

The plan supports previous WSDOT work, which determined that some safety rest areas in Washington have truck parking utilization rates over 100 percent. Silver Lake and SeaTac are the only two safety rest areas on Interstate 5 between Olympia and Everett, and they were constructed in conjunction with WSP weigh stations and do not provide legal parking for truckers unless they are stopping to be weighed or inspected. However, design consideration was given for overnight truck parking at these locations. Silver Lake has 14 truck parking spaces and SeaTac has 22. Trucks are currently allowed to park there because of this statewide deficiency in truck parking. These weigh stations both have an average demand of 13 and 20 respectively, and up to

[51] http://wsdot.maps.arcgis.com/apps/Viewer/index.html?appid=da8a50f800bb476c9073898ebcfdbbe9

Figure 8: SeaTac Weigh Station

20 and 35 utilizations overnight. In 2005, WSDOT also identified the western segment of Interstate 90, travelling westbound from Vantage to Seattle, as over capacity with 121 percent average utilization and 229 percent maximum utilization.

Truck Parking Expansion at Safety Rest Areas

WSDOT has created temporary truck parking when needed in order to address safety concerns. For example, WSDOT constructed Price Creek safety rest area as part of WSDOT's Interstate 90 Snoqualmie Pass East project.[52] This temporary safety rest area provided a vital rest point for travelers during WSDOT's multi-year project. This facility was then deconstructed to provide space for a wildlife crossing as the project progressed.

WSDOT has also expanded permanent truck parking at a safety rest area where demand for parking surpassed the supply. At Scatter Creek safety rest area, WSDOT received funding and was able to add several truck parking stalls by switching the car parking area with the truck parking area. Scatter Creek, located on the southern segment of the Interstate 5 corridor was at 147 percent capacity in 2005. The current capacity at Scatter Creek has been increased to 37 truck parking stalls, which is sufficient to meet demand based on 2005 levels, however demand has likely increased since that time.

Electrification at Safety Rest Areas

Federal law prohibits states from offering commercial services, such as food and fuel, at rest areas on the Interstate Highway System right of way,[53] as detailed in 23 U.S. Code § 111; this limitation only applies to the Interstate Highway System. This limits the level of amenities that can be provided at safety rest areas, including idle-reduction electrification systems, and provides the opportunity for private truck stops to offer truck parking and other driver amenities at private sites.

WSDOT and other state DOTs have tried to gain FHWA's permission to provide electrification at safety rest areas without success.

FHWA law stipulates that no commercial enterprise can be set up in rest areas or on highway right of way. Their current interpretation of the law is that electrification falls under commercial enterprise. However, state law[54] now provides incentive for electric vehicle infrastructure, but not specifically for idle-reduction systems for truck parking. In 2016, FHWA issued a request for public comments on how certain provisions of the current law surrounding commercial activities at rest areas should be interpreted and applied in consideration of advancements in technology and the interests of the states.

Parking Time Limits at Safety Rest Areas

State law limits the amount of time trucks can park at safety rest areas to eight hours.[55] Because truck drivers are required to rest for 10 consecutive hours, they are technically in violation of their federally required break by obeying the rules of the safety rest area. It is generally allowed, but not legal, for truck drivers to utilize safety rest areas for their 10-hour rest break.

Safety Rest Area Utilization

WSDOT lacks current truck parking use statistics at safety rest areas. Overall usage of rest areas is determined by water consumption (at a rate of 3 gallons per visitor). This metric does not differentiate truck traffic from general traffic. Regional WSDOT maintenance staff around the state have observed that many rest areas on Interstate 5, Interstate 90 and Interstate 82 are regularly over capacity with trucks parked overnight. As a result, many truck drivers park in unofficial locations on the shoulders of the entrance and exit ramps of safety rest areas. Because many truck drivers operate in multiple states, they may lack familiarity with highway corridors in Washington. Consequently, they

[52] http://www.wsdot.wa.gov/Projects/I90/SnoqualmiePassEast/

[53] http://codes.lp.findlaw.com/uscode/23/1/111

[54] http://app.leg.wa.gov/RCW/default.aspx?cite=47.38.070

[55] http://app.leg.wa.gov/RCW/default.aspx?cite=47.38.020

may not be taking full advantage of available parking opportunities along their route. Intelligent Transportation Systems (ITS) are currently in place with the 511 Traveler Information system and radio broadcasts for weather and traffic alerts, but real-time facility parking information via highway signage and dedicated radio broadcasts is not currently provided in Washington.

II. Weigh and Inspection Stations

A weigh and inspection station, often referred to simply as a weigh station, is a check point along a highway to inspect truck weights. Weigh stations are equipped with truck scales, some of which are "weigh in motion" systems that permit the trucks to continue moving while being weighed, while other scales require the trucks to stop. Amenities at weigh stations are limited; some have portable toilets but drivers should not expect to find restrooms, garbage cans or food and water at weigh stations.

Weigh stations are a common location for unofficial truck parking and WSDOT regional offices have reported trash and waste at some of the sites. There are 61 weigh stations in Washington, which include 53 regular weigh stations with in-ground scales, seven portable weighing scales and one Virtual Weigh-in-Motion site. WSDOT typically owns the land, while WSP typically owns the structures and other weigh station infrastructure. WSDOT and WSP jointly maintain and operate weigh stations. Only 14 of these weigh stations have designated truck parking spaces, with a total of 178 parking spaces. It is common to see trucks parked without official parking spots, or parked in undesignated locations near the weigh station when the truck parking spaces become full. Even so, WSDOT regional reports indicate that parking capacity is not really an issue at most weigh stations. WSDOT's 2016 Truck Parking Survey found drivers prefer parking at weigh stations to parking in other unofficial locations, such as entrance and exit ramps, yet do not frequently park at weigh stations. This is perhaps due to the proximity of commercial vehicle enforcement activities or because these locations have a low capacity for parking relative to other options.

WSDOT closed the southbound Interstate 5 weigh station in Federal Way in July 2016. This site was regularly used for brief and overnight truck parking. WSP ceased operations at the site in 2012 because trucks that needed inspection at the facility were required to merge into the newly constructed southbound State Route 18 entrance ramp, creating a safety issue for highway traffic and patrol officers. Since operations ceased in 2012, drivers continued to park at the site unofficially, without portable toilets or garbage service. WSP continued to use the site for law enforcement and investigation. In

consultation with WSP, WSDOT blocked access to the site in 2016 to prevent vandalism, waste dumping and other problems. Additional coordination is needed to determine the best use of this former weigh station, and other weigh stations in Washington used for truck parking.

In January 2016, the Washington State Joint Transportation Committee (JTC) published the Efficiency and Effectiveness of Weigh Station Management in Washington State report, which included information on truck parking at weigh stations. The study did not identify an entity responsible for truck parking data at weigh stations and suggested creating an interagency working group to better address weigh station management.[56] WSDOT and WSP are currently collaborating on a Weigh Station Strategic Plan, which will include information on truck parking.

III. WSDOT Right of Way

Currently, truck drivers park unofficially on WSDOT owned right of way, as it is easy for trucks to locate vacant areas alongside the highways they travel. WSDOT right of way includes roadsides, shoulders, highway exit and entrance ramps, mountain pass chain-up areas, passing zones and pullouts, among others. WSDOT right of way also includes land adjacent to highway corridors, under elevated roads and bridges and in the median of divided highways. According to the WSDOT Truck Parking Survey,

Figure 9: Damaged pavement at pull out

these locations are not preferred, but drivers will park there if need be. WSDOT's regional offices report right of way is often used for more frequent or longer term truck parking, creating issues such as pavement deterioration, waste accumulation and safety risks.

IV. Land Owned by Cities and Counties

Cities and counties can permit and prohibit truck parking in their communities. Typically, cities will allow truck parking in commercial and/or industrial zones, prohibit parking in residential areas and limit parking to short-term, delivery parking in designated areas. Areas with zoning and land uses that generate truck traffic (e.g., mining, industrial, manufacturing, warehousing, commercial) are ideal locations for providing truck parking. Truck drivers also use abandoned lots to avoid being noticed or bothered. Locations near major truck routes also provide ideal highway-oriented land use, such as truck parking. Trucks often park for short and long breaks on industrial and commercial roads in cities, especially near major freight hubs, such as ports. Cities and counties sometimes allow on-street parking in these areas or provide off-street parking lots for trucks. Truck parking in these locations may be legal or illegal, depending on the local codes. Truck drivers sometimes park in residential neighborhoods, especially if they are unable to locate parking elsewhere. Officials in some cities have expressed concern about the financial and environmental effects of trucks parking on their streets.

Some cities have citywide bans or restrictions on truck parking. Seattle, for example, limits commercial vehicle loading to 30 minutes. The city's traffic code does not allow a vehicle to park on a city street for longer than 72 hours. Additionally, the Seattle municipal code prohibits vehicles over 80 inches in width (e.g., RVs, tractor trailers, larger trucks) from parking on most city streets (any street except those adjacent to manufacturing or industrial zoning) between the hours of midnight and 6 a.m.[57] These restrictions limit the legal parking of trucks in most of the city. Another example is North Bend, where truck stops

[56] http://leg.wa.gov/JTC/Documents/Studies/Weigh%20Station_2015/FinalReportWeighStationStudy_January2016.pdf

[57] http://www.seattle.gov/transportation/parking/parking72hour.htm

are not allowed to be constructed or expanded, due to a new law passed in May 2016, and no truck parking is allowed on city streets. Auburn, on the other hand, allows commercial vehicles to park in designated locations.

V. Ports

Washington is home to 75 port districts, which can be major generators of truck traffic. Ports are responsible for moving freight between on land transportation modes, such as trucking, and the waterways in Washington state. Trucks that serve large international container terminals, such as the Northwest Seaport Alliance's (NWSA) terminals in Seattle and Tacoma, primarily move goods between port terminals and local intermodal rail yards, as well as warehousing and distribution centers. To a lesser extent, long-haul and regional trucks also serve these ports. The needs of short-haul (drayage) drivers can differ from the needs of long-haul or regional drivers. Truck drivers serving ports may require space to queue at ports while waiting to pick up or deliver a load. Some ports, and their tenants, have taken steps toward helping truck drivers meet their queueing and parking needs.

Queueing

Drivers sometimes require space to queue while waiting to pick up or deliver a load at a port. Some terminals offer space for trucks to queue while waiting to deliver or pick up their load. All NWSA container terminals, for example, have off-street truck queuing areas holding between 60 and 120 trucks. Despite the ports sharing gate hours and break schedules with drivers, some trucks arrive before terminal queuing areas are open, or during scheduled breaks (e.g., lunch). When the number of trucks in the on-terminal queueing areas exceeds the capacity, queueing on access roadways occurs and can create delays.

To address queuing problems, NWSA officials implemented a new mobile app, DrayQ, to provide real-time information about both on- and off-terminal queuing times to truck drivers and dispatchers. The technology is intended to improve efficiencies and allow drivers to avoid congested terminals, thereby reducing truck queues in front of NWSA container terminals.

In part to address these queuing issues during the busy holiday season, from August through early December 2016, NWSA officials extended gate hours for 15 weeks to accommodate increased traffic flow, which amounted to approximately 50 additional hours each week.[58] NWSA officials reported approximately 8 to 10 percent of total cargo volumes passed through terminal gates during the extended hours.[59] NWSA leaders also are working to address queuing and safety concerns at their busiest Seattle terminal: T-18. In 2015, the Seattle Department of Transportation (SDOT) released an update to the Terminal 18 Bathroom Facility Study. Drivers often lack adequate parking near and in port terminals, making it difficult and sometimes hazardous to do something as simple as using the restroom. The study determined three parking spaces at each fixed bathroom facility is ideal to improve access and increase safety in port queuing lines.[60]

Truck Parking

Ports also experience truck parking issues in surrounding areas for short-term and longer-term parking or truck storage. Truck drivers may require temporary parking while waiting for port gates to open, longer-term

[58] https://www.nwseaportalliance.com/news/1032016/terminal-operators-benefit-nwsa-peak-season-extended-gates-program

[59] https://content.govdelivery.com/accounts/WASA/bulletins/1783f52#link_1444941852585

[60] https://www.seattle.gov/transportation/docs/T18BathroomStudyFinal.pdf (page 26)

parking to satisfy hours-of-service requirements, or space for storing their truck. Truck parking options are often limited near port facilities and truck drivers will park on the streets in industrial areas or unofficially in residential neighborhoods. For example, near the Port of Vancouver, trucks reportedly park in and travel through residential areas. Signs and enforcement have been used to address this issue. To address community concerns related to truck parking issues near the Port of Seattle, the port created a parking area near its Duwamish MIC container terminals in 2009. This was a recommendation of a working group tasked with addressing truck parking issues in residential areas in South Seattle. Drivers who service these facilities can park their personal vehicles during the day and their tractors at night (parking for chassis or trailers is not allowed). This lot is provided as a free option for drivers specifically to alleviate parking pressures on residential streets near container terminals, such as in the Georgetown and South Park neighborhoods. The lot is located at the corner of East Marginal Way and Spokane Street in Seattle, and has 125 parking spots, which are usually all filled. Port staff began conducting periodic "windshield surveys," to count port trucks parked throughout South Seattle industrial and residential areas. In 2013, port staff observed approximately 215 trucks parked in South Seattle locations, while in 2016, that number dropped to 125. After Seattle installed signs indicating residential streets where truck parking is prohibited, NWSA officials report trucks are avoiding residential streets and parking legally in the industrial areas of South Seattle.[61]

Ports may have an effect on parking demand beyond their immediate vicinities. Long-haul trucks that serve ports, to some degree, travel over mountain passes and in Eastern Washington. For example, approximately 11 percent of container terminal truck trips cross Lake Washington on Interstate 90, according to NWSA officials; many of the trucks are headed for or coming from warehousing and distribution centers or agricultural centers in Eastern Washington.[62] Some bulk agricultural products originating in eastern Washington (e.g., fruit, hay, potatoes) are transported on flatbed or hopper trucks to ports in western Washington for export. In North Bend, where high truck traffic and demand for parking occurs, the truck stop is regularly at capacity. Some stakeholders thought that extended terminal hours at NWSA container terminals would help decrease demand for parking near these terminals, including nearby freeway truck stops. According to NWSA officials, they intended the extended gate hours to facilitate efficiencies during the peak season, including reducing the potential for off-terminal truck queues. While not a stated reason for the hours extension, communities such as North Bend also hoped to see a decrease in truck parking demand.

However, NWSA officials noted that their terminals are primarily served by trucks making drayage, local and regional trips, and therefore officials did not expect extended hours to affect parking demand for long-distance trucks. Anecdotal evidence from the North Bend truck stop suggests there was no decrease in truck parking demand there.[63]

[61] POS Email to City of Seattle Council Members, 7/16/2013, and data from a 10/18/2016 windshield survey conducted by Port of Seattle staff.

[62] Northwest Seaport Alliance, Container Terminal Access Study, 2015.

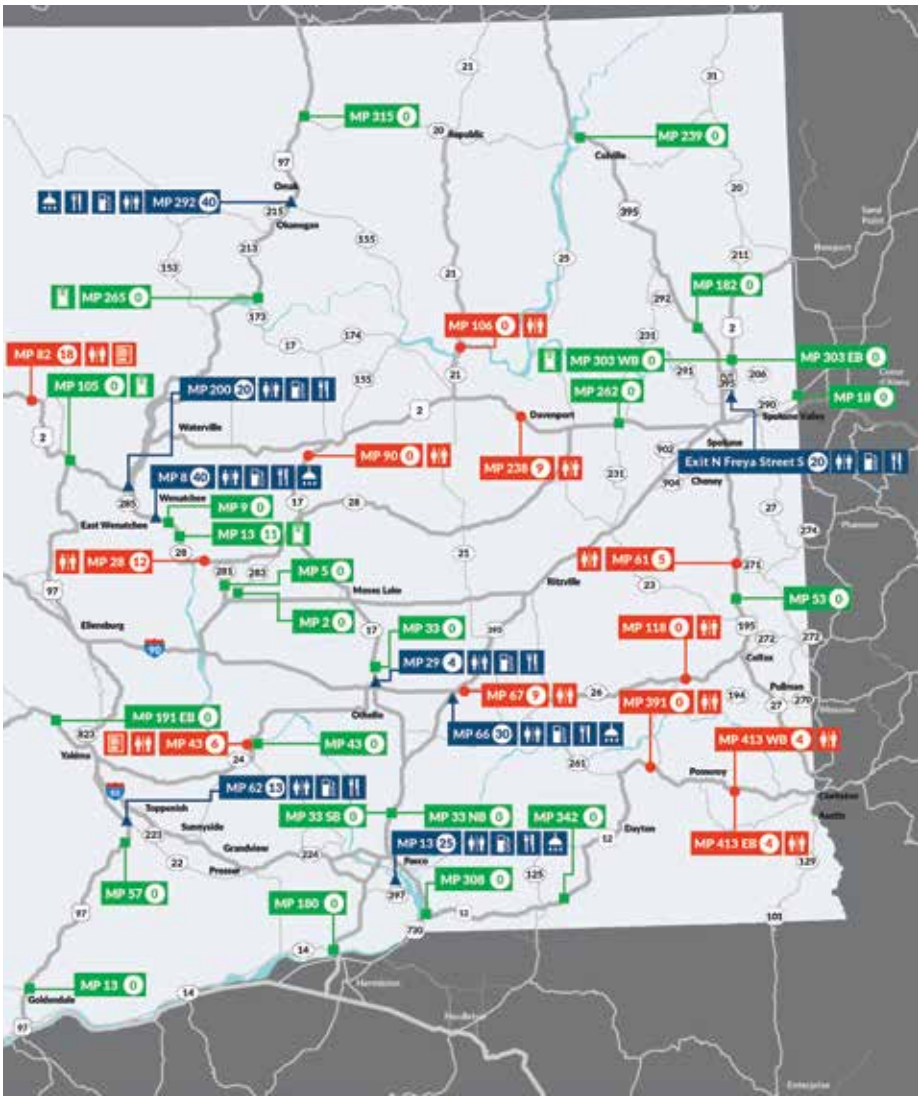
[63] http://www.theeastside.news/snovalleystar/news/local/port-program-does-little-to-reduce-truck-traffic-in-north/article_672752f8-7aaf-11e6-b2c3-8b2ec122603d.html

5 Truck Parking Map

To help truck drivers and dispatchers with finding truck parking facilities, WSDOT developed a state truck parking map. The map shows the location of private truck stops, state safety rest areas and state weigh stations. The corridor, exit number or milepost, parking capacity and some available amenities are listed for each location. WSDOT's truck parking map will be distributed at safety rest areas in Washington and can be downloaded here: www.wsdot. wa.gov/Freight/truckparking. The map will be updated periodically.

WSDOT used a variety of sources to determine where private truck locations. WSDOT consulted online databases such as Trucker's Friend, DieselBoss, Truck Stop Info Plus and Truck Smart Parking Services to determine private truck stop locations, capacity and amenities, and compared that information with data from the Jason's Law truck parking survey of private facilities in Washington. There were often discrepancies between the data sources, making it difficult to determine capacity and amenities. WSDOT verified the parking capacity of each parking facility using aerial footage from Google Maps and called truck stops to verify amenities. When the number of parking spaces reported online or by Jason's Law did not match with WSDOT's observations, WSDOT recorded the observed number. WSDOT used conservative estimates when reporting parking capacity. These numbers should be viewed as approximations, as many private truck stops do not have lined parking and the capacity may vary based on

Figure 10a: Truck parking map (Eastern Washington Non-Interstate Highways)



how trucks park their vehicles in undesignated spaces. Private truck stops that did not appear to have capacity for safe truck parking were not included on the map.

Internal WSDOT resources were used to determine location and capacity at the state's 47 safety rest areas. WSDOT also worked with the Washington State Patrol to determine truck parking capacity at weigh stations. All state operated weigh stations are listed on the map, however not all have designated truck parking. Truck parking capacity for state weigh stations and safety rest areas includes only lined truck parking stalls. This map does not provide an exclusive list of all private truck parking facilities in Washington, but it should give truck drivers and dispatchers some ideas for where to locate private truck parking. In total, WSDOT located more than 2,400 private truck parking spaces statewide. There are also more than 500 truck parking spaces available at safety rest areas and 182 truck parking spaces at state weigh stations. Most truck parking facilities are located along major truck routes. The map also helps drivers identify areas with gaps in available parking.

Figure 10b: Truck parking map (Western Washington Non-Interstate Highways)

6 Stakeholder Engagement

WSDOT engaged industry participants and truck parking users to gain a holistic understanding of truck parking needs in the state. The outreach included an online survey, several roundtable discussions and one-on-one interviews, including a ride-along with a professional truck driver. WSDOT also reached out to regional WSDOT offices across the state to understand better the unique concerns of Washington's diverse regions.

FHWA's Jason's Law survey, and other recent state surveys, influenced the development of WSDOT's survey questions. The FHWA, Washington Trucking Association partners and other trucking industry participants reviewed the survey prior to distribution. WSDOT sent the survey link via the state's Freight Alert subscription email system. WSDOT also sent the survey via email to trucking associations in nine western states and British Columbia and to the national associations for independent truck drivers and truck stop owners. WSDOT encouraged truck drivers, company owners and other employees familiar with state parking issues to participate. A summary of the survey findings and full survey results are available online.[64] The survey received 1,118 responses, 84 percent of which were from truck drivers. Among other findings, the survey determined that:

- Interstate 5, Interstate 405 and Interstate 90 have the greatest truck parking shortage, followed by Interstate 82 and State Route 167
- Private truck stops are preferred by truck drivers for both short and long-term parking, followed by safety rest areas
- Short-term and overnight parking is difficult to find, with 60 percent of respondents taking 60 minutes or longer to find overnight parking
- Truck parking shortages increase safety and legal risks, such as driving while fatigued or outside maximum hours-of-service

WSDOT also organized a series of roundtable discussions at various locations where truck parking is a known concern. The goal of the roundtable discussions was to provide WSDOT with a comprehensive view of truck parking concerns in the state and to better understand the unique needs of different regions and stakeholders. Truck drivers, and representatives from trucking companies, were invited to participate and share their truck parking experiences. Roundtable participants also included port officials, city and MPO representatives and Washington Trucking Association (WTA) representatives, among others. The following cities hosted roundtable events between March and July of 2016:

- Tukwila – March 17, 2016
- Tacoma – May 26, 2016
- North Bend – June 14, 2016
- Vancouver – July 20, 2016
- Seattle – July 25, 2016

WSDOT also participated in two one-on-one interviews with truck drivers. The first interview was with an owner-operator with 38 years of experience driving long-haul, including routes in Washington. The driver provided WSDOT with invaluable information regarding his experiences with truck parking in Washington and many of his comments were similar to those from WSDOT's survey respondents. For the second interview, a WSDOT employee participated in a ride-along with

[64] http://www.wsdot.wa.gov/Freight/truckparking.htm

a driver in his truck as he picked up and delivered loads. The ride took them from Federal Way to Bellingham and back and added another valuable perspective on truck parking issues in Washington state.

Finally, WSDOT reached out internally to regional WSDOT offices about their experiences with truck parking. Much like in the roundtable discussions, each region had concerns that were specific to their location and particular needs. These efforts to engage industry, community and regional WSDOT offices resulted in several findings, which are summarized below. Many of these community outreach findings give anecdotal support and real-world examples to the research WSDOT has conducted on truck parking.

7 Identified Issues

Through outreach and research, WSDOT identified many issues that relate to truck parking. Truck parking issues in Washington are growing in intensity due to increasing demand that is not being adequately met by supply. The following issues reflect feedback from outreach participants as well as data gathered from a wide range of resources. Driver and highway safety is one such issue that is closely associated with inadequate truck parking. WSDOT also found that certain locations, such as urban/metro areas, experience the most pressing truck parking issues. In addition, WSDOT explored industry concerns, such as the discrepancy between truck parking preferences and use. Other key issues include environmental concerns, infrastructure constraints and communication and coordination needs.

A. SAFETY

I. Driver Safety

The personal safety of drivers is a nationally recognized issue. Congress passed Jason's Law in 2012 in response to the murder of Jason Rivenburg, a truck driver who, unable to find a safe place to rest until his delivery location opened, parked at an abandoned gas station. Unfortunately, such events are not uncommon. From 2010 to 2014, 40 big-rig drivers were killed in the United States.[65] Robberies and cargo theft are even more common. Eighty-eight percent of drivers say they are concerned about robbery and over 10 percent have been victims of robbery at rest areas.[66] There are steps drivers can take to prevent trailer and cargo theft. Ninety percent of cargo theft occurs when a trailer is dropped.[67] Drivers must keep an eye on their trailers, especially in vulnerable locations such as truck stops and other common drop locations. Technologies such as trailer tracking devices and locking systems can help with security.

According to the FHWA truck parking survey, 90 percent of drivers have struggled to find safe parking at night.[68] WSDOT's own survey reflects this finding; 59

[65] https://www.trucks.com/2016/08/02/truck-parking-shortage-driver-crime/

[66] NCHRP Guide for Reducing Collisions Involving Heavy Trucks 2004 (page V-8)

[67] http://www.hubinternational.com/transportation/blog/cargo-theft-prevention-tips/

[68] Jason's Law Truck Parking Survey Results and Comparative Analysis 2015 (page 66)

percent of respondents reported that they frequently (four to seven nights per week) were concerned with safety while parked in Washington. Crimes against drivers tend to occur at unsecured lots, such as rest areas,[69] however crimes can occur at private truck stops as well. In March of 2016, a driver was killed inside of his cab at a truck stop in Sumner off State Route 167; the killer has yet to be identified as of this writing.[70] Drivers also report receiving illegal solicitations from drug dealers and prostitutes at some parking locations, further compromising their sense of personal security. The public recognizes these safety concerns and the effect on surrounding areas, which makes it difficult for truck parking facilities to gain support of the community and can lead to ordinances banning truck parking.

II. Highway Safety

Lack of available truck parking is a safety problem for not only the commercial trucking industry but for all highway users. Trucks parked in unofficial locations such as exit and entrance ramps, chain up/down areas on mountain passes and on roadway shoulders pose a safety hazard to the public. Truck drivers park in unofficial locations for many reasons, including capacity constraints at nearby parking locations, lack of knowledge of local parking options, hours-of-service limitations and concern for their own personal safety. Often drivers are faced with the choice of parking in unofficial locations or violating their hours-of-service requirements, which are implemented to ensure drivers get adequate rest. To adhere to these requirements, and to prevent driving while fatigued, drivers may elect to park in an unofficial location such as an exit or entrance ramp. State patrol officers are then required to decide if they are going to ask the driver to move from the unofficial parking location, at the risk of violating their hours-of-service and putting a tired driver back on the road. Although crashes involving a truck parked on ramps or roadsides are uncommon, they are more likely to result in a fatality.[71] Due to safety and access concerns, Washington prohibits parking on the right of way of interstate highways, including shoulders, ramps and medians (Revised Code of Washington 47.52.120(e)).

Some evidence indicates insufficient parking also may increase the likelihood of truck crashes. A Michigan study found that fatigue-related truck crashes increase when rest areas are more than 30 miles apart, indicating that availability of parking may affect fatigued driving and roadway safety. According to a study by AAA Foundation for Traffic Safety, drivers who have slept for less than four hours are just as likely to get in a crash as a driver with a blood alcohol content level of 0.12 to 0.15[72]—which is nearly double the legal limit of 0.08 in Washington. Single vehicle truck crashes, where the truck driver has driven off-road for no clear reason, increase between the hours of midnight and 8 a.m., indicating that these crashes may be fatigue related.[73] Research has shown that truck driver fatigue is greater when driving at night, regardless of how much they had slept during the day.[74] According to FMCSA, fatigue is a contributing factor in 16 percent of truck collisions and 8 percent of fatal truck collisions.[75] The National Highway Traffic Safety Administration (NHTSA), on the other hand, reports that fatigue plays a role in as many as 30 to 40 percent of all truck crashes.[76] Approximately 60 percent of respondents to WSDOT's Truck Parking Survey reported they frequently (3 to 5 days per week) or regularly (six to seven days per week) drive fatigued due to a shortage of truck parking.

[69] https://www.trucks.com/2016/08/02/truck-parking-shortage-driver-crime/

[70] http://komonews.com/news/local/police-man-found-stabbed-to-death-inside-truck-in-sumner

[71] NCHRP Guide for Reducing Collisions Involving Heavy Trucks 2004 (page V-7)

[72] https://www.washingtonpost.com/local/trafficandcommuting/sleep-deprived-drivers-have-plenty-in-common-with-drunk-drivers/2016/12/06/2f83d166-bbcb-11e6-91ee-1adddfe36cbe_story.html?utm_term=.2a59fd0f41b9

[73] Rest Are Use: Data Acquisition and Usage Estimate, Montana Department of Transportation (page 18)

[74] NAP Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety 2016

[75] Quan, K. (2006). Truck Parking Issues and Programs. Presented at Talking Freight Seminar, Federal Highway Administration, United States Department of Transportation.

[76] http://www.ntsb.gov/news/events/Documents/truck_bus-SIR0001.pdf (page 2)

Compensation structures, commuting patterns, irregular schedules and inability to find safe parking are just some reasons commercial drivers may drive fatigued. Poor quality sleep can also lead to driver fatigue; it is therefore essential that truck drivers' rest is uninterrupted. Fifteen percent of drivers were asked to move from their parking location more than six times in a year, according to The National Cooperative Highway Research Program (NCHRP), not only interrupting their rest but forcing drivers to drive fatigued. Additionally, many drivers find their rest interrupted at unsecure parking locations (such as safety rest areas) by unwelcome solicitations and inquiries, making good rest hard to come by.

Fatigued driving is not just a concern for commercial truck drivers. Studies have found non-commercial drivers are more likely to cause crashes due to falling asleep at the wheel than commercial/truck drivers.[77] The National Academies Press identities rest areas as a way to combat driver fatigue,[78] as does the Washington State Strategic Highway Safety Plan 2016: Target Zero.[79] Target Zero recommends improving rest area access, security and services in order to reduce the consequences of drowsy driving for all motorists.

Overall, truck crashes appear to be on a downward trend. Although truck vehicle miles travelled has increased by 70 percent over the past 20 years, the number of large trucks involved in fatal crashes decreased by 32 percent from 1980 to 2014.[80] Alcohol involvement for truck drivers in fatal crashes has decreased by 80 percent over the same time period.[81] Traffic fatalities from truck crashes in Washington have decreased from a high of 82 in 2007 to 36 in 2014.[82]

NHTSA and FMCSA have proposed a federal cap on heavy truck speeds, which would electronically prevent trucks from exceeding either 60, 65 or 68 miles per hour. The purpose of this proposal is to further reduce the number of fatal truck crashes in the U.S. and save on fuel costs. While some see speed restrictions as an important safety tool, other groups, such as OOIDA, believe it will have the opposite effect by increasing interactions between cars. Currently states set their own speed limits. In Washington, the speed limit for trucks is capped at 60 miles per hour, although in four Western states, the maximum speed for trucks is 80 miles per hour, above the speed for which truck tires are designed.[83]

III. Unofficial Parking

Many outreach participants, particularly WSDOT's regional offices, were concerned about trucks parking in unofficial locations, such as pullouts and exit and entrance ramps. Trucks parked in unofficial locations cause damage to state right of way as the pavement is not meant to handle such frequent and heavy traffic. Unofficial parking locations also lack proper amenities, such as restrooms and garbage cans, which leads to an accumulation of garbage, used truck tires and human waste. Outreach participants frequently cited Snoqualmie Pass, and the surrounding areas on Interstate 90, as an example of an area with extensive unofficial parking problems. Unofficial parking locations also include trucks parking in residential neighborhoods or at scenic viewpoints. In these instances, trucks mingle with recreational

[77] http://www.trucking.org/ATA%20Docs/News%20and%20Information/Reports%20Trends%20and%20Statistics/02%2012%2013%20--%20FINAL%202013%20Car-Truck%20Fault%20Paper.pdf (page 4)

[78] NAP Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety 2016

[79] http://www.targetzero.com/PDF2/targetzero.pdf (page 86)

[80] http://www.trucking.org/ata%20docs/what%20we%20do/image%20and%20outreach%20programs/misc%20documents/Safety_Facts.pdf

[81] ATA Trucking Safety Facts 2009: http://www.trucking.org/article/Trucking-Safety-Facts

[82] http://www.targetzero.com/PDF2/targetzero.pdf (page 162)

[83] http://www.freep.com/story/money/cars/2016/08/26/us-wants-lower-speeds-truck-and-bus-drivers/89408056/

Figure 11: Pull-out on State Route 97, Mile Post 273

traffic and pedestrians. Outreach participants were also concerned with drivers parking their trucks and leaving them during days off; there seems to be a lack of legal truck storage lots. WSDOT's regional offices provided detailed information on the location of unofficial truck parking, which was used to inform this study.

Unofficial parking creates safety concerns both for drivers and others. Some truck drivers reported not being willing to park on ramps due to the potential for a crash. Outreach participants felt other unofficial parking locations, such as chain-up areas, were safer, so long as there is separation between the area and passing motorists. The truck drivers who WSDOT spoke with viewed unofficial parking as a last resort and would much rather use legal parking options.

B. LOCATIONS OF CONCERN

In addition to the identification of key corridors with truck parking concerns, WSDOT identified three distinct areas of the state with pervasive truck parking needs: metropolitan and urban areas, international and state borders and mountain passes and surrounding communities.

I. Metropolitan and Urban Areas

WSDOT's outreach participants cited urban areas, especially the Puget Sound region, as having the greatest unmet demand for truck parking. Drivers coming to or from Seattle must plan at least two hours to reach the nearest parking location. Truck travel times are affected by congestion on the roadways and with cross traffic, limiting the productivity of drivers within their hours-of-service limitations. Larger trucks may have more difficulty navigating in urban areas, creating even slower delivery times and missed appointments for delivery or pick-up. Cities that have numerous truck traffic-generating facilities, such as those on the State Route 167 corridor, experience significant traffic and intensified parking issues.

Highly developed areas, such as in downtown Seattle or other congested areas, create problems for truck parking and deliveries. When trucks arrive at their destinations, there are often few options to legally park

because many urban businesses do not have a shipping/receiving area. Truck drivers are therefore required to find a nearby place to temporarily park their truck while unloading and loading. If legal options are not available, the driver may park in a travel lane, in a turn lane or in bicycle and pedestrian areas. As a result of parking in these unofficial locations, drivers may receive parking tickets. Some trucking companies that regularly serve urban areas receive parking citations often enough that they say they factor that into their business expenses of serving those areas.

Commercial loading zones help trucks access businesses in urban areas and minimize parking citations. A recent study in Chicago attributed nearly 40 percent of truck parking citations to truck bans, either for specific types of roads or designated neighborhoods. Although the bans allow trucks to be parked during loading and unloading, the schedules for shipping or receiving, which are typically controlled by the receiver, require trucks to do a lot of waiting between deliveries[84] Seattle has initiated a Commercial Vehicle Pricing Project to evaluate strategies for managing commercial vehicle load zones in the downtown area.[85] SDOT issues over 4,000 permits for their commercial loading zones each year, which allow trucks to park for 30 minutes. The pilot project, funded by FHWA, will use technology that allows drivers to more easily locate loading zones, enhances parking enforcement of loading zones and improves delivery truck access during construction projects. SDOT found that use of loading zones by commercial trucks is highest between 11 a.m. and 3 p.m. SDOT also observed that passenger vehicles frequently park in loading zones and that 23 percent of commercial vehicles stayed longer than the 30-minute parking time limit.

II. Border Crossings

Trucks are essential to transporting goods and services in and out of Washington, yet crossing borders remains a concern when it comes to parking. Canada is Washington's largest trading partner in terms of imports[86] and second largest partner in terms of exports.[87] It is therefore crucial that trucks be able to cross the international border in a safe and efficient manner, but crossing Washington's border with Canada can create truck parking challenges.

Over 3,000 trucks cross through the system of border crossings in northwest Washington every day, carrying nearly $44 million in freight.[88] International borders slow trucks because of the regulatory activities conducted by U.S. Customs and Border Protection and the Canada Border Services Agency. Due to delay, travel times are affected, resulting in reduced operating hours by truck drivers.

Truck drivers must plan for possible delays when crossing the international border, which creates demand for parking on both sides of the border. The Abbotsford-Sumas Border Improvement Project[89] identified constraints and developed solutions for the border crossing between Sumas and Abbottsford, British Colombia. Phase II of this project added additional commercial vehicle parking to eliminate southbound truck queues caused by trucks parked in the roadway. Blaine, also located at the Canadian border, sees parking demand disproportionate to its size as drivers crossing the border look for a convenient location to park. While truck parking is illegal on residential streets in Blaine, trucks or trailers frequently line Blaine's industrial streets, creating maintenance issues for the city.

Border crossings with other states are also an issue for truck parking, because policies and laws change when trucks enter Washington from Oregon or Idaho. For example, in Oregon and Idaho, triple trailers are allowed, whereas in Washington they are not. Therefore, cities on the state border often experience

[84] http://trrjournalonline.trb.org/doi/pdf/10.3141/2411-03

[85] http://www.seattle.gov/transportation/parking/CVLZpilot.htm

[86] https://www.census.gov/foreign-trade/statistics/state/data/imports/wa.html#ctry

[87] https://www.census.gov/foreign-trade/statistics/state/data/wa.html#ctry

[88] http://theimtc.com/wp-content/uploads/2016ManualOnline.pdf

[89] http://theimtc.com/abbotsford/

high demand for trailer parking. When this demand is not met, trailers will be left in unofficial locations. Vancouver, on the Washington-Oregon border, has cited concerns with the number of dropped trailers lining city streets.

III. Mountain Passes

Pass closures create significant challenges with trucks parked along roadways and shoulders, on exit and entrance ramps and in business parking lots. The Cascade mountain range bisects the state into western and eastern regions; highways over the passes of the Cascades connect businesses and international ports on the west side of the state with farms and businesses in Eastern Washington and beyond. Snoqualmie Pass on Interstate 90 serves as the primary freight corridor across the mountains. In the winter, some mountain passes are completely closed, and those that remain open are subject to weather-related closures. Chain-up requirements are also common during winter months, which require trucks to park along the pass to install chains, further delaying their travel.

Communities on either sides of the pass experience high demand for truck parking during pass closures and other weather delays. For example, when Snoqualmie Pass is closed, trucks will park on city streets waiting for it to reopen. “Safeway Hill” in Ellensburg is a common location for unofficial truck parking during pass closures. North Bend, on the western side of Snoqualmie Pass, is also often at capacity with parked trucks. Trucks line the shoulders and exit- and entrance-ramps near North Bend once official parking locations are full. North Bend is also the only city on the western side of the Interstate 90 corridor with a truck stop. Therefore, trucks travelling into the congested Puget Sound metro region will park in North Bend. Some North Bend residents worry about the safety, environmental and financial effects of this unofficial parking. In an effort to resolve truck parking concerns in the city, North Bend has banned truck parking on city streets and prevented development or expansion of truck stops. These activities have strengthened the need to develop truck parking opportunities in this corridor.

C. TRUCKING INDUSTRY

I. Mismatch Between Parking Preference and Use

Many of the comments from WSDOT’s outreach efforts focused on preferences for truck parking in Washington. Participants discussed areas in the state where parking facilities are over capacity, reasons for truck parking demand and best practices and suggestions for meeting parking demand with adequate supply.

Table 2: Ranked Overnight Parking Preferences v. Use

Parking Type	Preference	Actual Usage
Private truck stop	1	1
Public rest area	2	2
Shipper/reciever location	3	7
Abandoned lot	4	5
Weigh station	6	8
Roadside	7	4
Temporary parking lot (e.g., WalMart, casino)	8	6
Highway on-ramp/off-ramp	9	3

Source: WSDOT 2016 Truck Parking Survey Summary

Engagement efforts determined that irregular schedules and routes often leave drivers without the knowledge they need to find legal parking, leading to unofficial truck parking. WSDOT's 2016 survey revealed drivers prefer to park at truck stops, with safety rest areas being their first alternative. Survey respondents, and other outreach participants, mentioned that their preferred parking options are not always available, which leads them to park in undesirable or unofficial locations. For example, drivers ranked shipper and receiver locations as their third parking preference, yet for actual use this location is ranked seventh. Similarly, entrance and exit ramps are the third most commonly used sites for parking, but are least preferred by drivers. For more information, see WSDOT's 2016 Truck Parking Survey.[90]

Drivers also like to be able to park near their job sites, which leads to unofficial parking near ports, such as on Shilshole Avenue in Seattle. Outreach participants expressed concern that parking along Shilshole may be eliminated as Seattle expands the Burke-Gilman pedestrian and bike trail.[91] Drivers also reported a desire for trailer storage options, particularly near border cities such as Vancouver on the Washington-Oregon border and Blaine on the Washington-Canada border. Local drivers often park near work sites and leave their trucks when they go home for the night, sometimes parking their trucks on city streets.

To improve parking supply, outreach participants suggested alternative options for truck parking should be considered, such as state operated and private yards, land under power lines, shipper/receiver locations, park and ride lots and shopping centers. The roundtable participants also discussed modifying city ordinances to be more truck friendly. For example, participants liked the idea of cities offering overnight parking in designated areas. One participant cited Wyoming as an example of a state that offers exclusive truck parking at state-owned facilities. This parking is basic, paved lots with striping and dumpsters, but helps meet the growing demand for truck parking.

II. Driver Shortage

ATA reports the trucking industry has a shortage of qualified drivers, and a rapidly aging workforce. ATA estimates that the industry has a deficit of 35,000 to 40,000 drivers, which is expected to grow along with freight demand and worsen as drivers retire.[92] While this is a commonly held belief, it should be noted that some entities, including OOIDA, question whether or not there really exists a shortage of skilled truck drivers. They argue that, if a driver shortage existed, driver wages would be higher.

A shortage of truck drivers relates to truck parking because fewer drivers are available to take advantage of practices that maximize truck utilization. Team driving, where one driver rests in the truck, while another drives, can maximize the moving time of the truck and decrease demand for parking, particularly on long-haul routes. Slip-seating is a practice where multiple drivers share a truck, which is

[90] http://www.wsdot.wa.gov/Freight/truckparking.htm

[91] http://www.seattle.gov/transportation/BGT_ballard.htm

[92] http://www.trucking.org/ATA%20Docs/News%20and%20Information/Reports%20Trends%20and%20Statistics/10%206%2015%20ATAs%20Driver%20Shortage%20Report%202015.pdf

more common on local routes. These practices are based on the concept that when a truck is not moving it is not generating revenue; additional drivers taking advantage of these practices would reduce demand for parking overall.

Qualifications and requirements, such as a commercial driver's license (CDL), insurance and background checks, may make it difficult for potential drivers to enter the industry. Although any driver over 18-years old with a valid Washington driver's license can operate a commercial vehicle with a Commercial License Permit,[93] they must abide by restrictions such as accompaniment by a valid CDL holder. Knowledge and skills tests also are required to obtain a CDL. To operate commercial vehicles from state to state (interstate) drivers must be at least 21 years old, thus eliminating many truck driving jobs as an immediate career for recent high school graduates. Additional endorsements are required for a CDL driver to haul hazardous materials, a tank vehicle, a double-trailer, or in other states, a triple-trailer. These barriers to entry may be part of the reason the average age of a truck driver is 49 years old, as compared to 42 for the general U.S. working population.[94] In addition, only 6 percent of drivers are women, as compared to 47 percent of the U.S. working population, leaving a large portion of the hirable population untapped.[95]

III. Business Decisions

Private organizations, such as shipper/receiver locations and trucking companies, make business decisions that affect truck parking. Many of WSDOT's outreach participants said timing is an important industry operational constraint that increases truck parking needs. Participants said shippers and receivers are often only open during a narrow window, so timing a route correctly is crucial, yet very difficult. For example, unplanned waits can affect hours-of-service and create parking demand. This is a particular issue around Snoqualmie Pass as pass closures and traffic congestion in the metro area creates demand for parking near the pass. In addition, truckers can have layovers of several days before a load is ready to pick up. The roundtable discussions revealed most shippers and receivers do not offer overnight parking and are very strict on appointment windows; trucks that arrive 30 minutes early to their appointment are turned away. Likewise, if a driver misses their appointment, they may have to wait days for another or receive a fine. One possible solution to these timing issues is to increase delivery windows, thus allowing drivers to operate during less busy times and decrease parking demand during peak times.[96] However, outreach participants noted most supply chains are not equipped for this shift in operations.

Trucking companies are equally unlikely to provide overnight parking, although larger companies are more likely to offer their own drivers parking options. Participants also were concerned with the way drivers are compensated for their work. According to ATRI data, most (74.1 percent) of surveyed drivers were paid by the mile and 19.6 percent were paid by the load. New drivers, they noted, are generally compensated at a rate of about $0.27 per mile. Above average pay for a truck driver is approximately $0.45 to $0.50 per mile.[97] Long-haul truck drivers, on average, drive 10,000 miles per month and are not paid for time spent detained (e.g., waiting to cross a border or at a weigh station).[98] Participants noted that turnover is high in driving companies, with the average time at a company being one to two years.

IV. Willingness to Pay

If drivers must pay to park, the parking should be affordable and sensible, outreach participants

[93] http://www.dol.wa.gov/driverslicense/cdl.html

[94] http://www.trucking.org/ATA%20Docs/News%20and%20Information/Reports%20Trends%20and%20Statistics/10%206%2015%20ATAs%20Driver%20Shortage%20Report%202015.pdf (page 8)

[95] http://www.trucking.org/ATA%20Docs/News%20and%20Information/Reports%20Trends%20and%20Statistics/10%206%2015%20ATAs%20Driver%20Shortage%20Report%202015.pdf (page 8)

[96] ATRI Managing Critical Truck Parking Case Study – Real World Insights from Truck Parking Diaries (2016)

[97] http://www.truckdriverssalary.com/how-much-does-a-truck-driver-make-per-mile/

[98] http://www.truckdriverssalary.com/how-much-does-a-truck-driver-make-per-mile/

observed. Although drivers prefer free parking options, they do find value in paying reasonable rates for a space that is safe and legal. Drivers reported that they have paid rates of $10 to $20 a night for parking, as well as a monthly parking fee. Participants presented several ideas for paid parking options, such as: a payment transponder similar to Washington's *Good-To-Go* tolling system, creating paid lots in underused locations and issuing a pass for state-owned lots with daily and annual options. Although some drivers are willing to pay to park, participants also mentioned that many truck drivers do not have sufficient income for such fees. WSDOT's Truck Parking Survey produced similar findings. Approximately 58 percent of survey respondents were unwilling to pay a fee, while 42 percent were willing, with the preference being for small, daily fees, rather than an annual fee. Also, drivers were more amenable to truck parking fees when the cost is covered by their employer.

D. ENVIRONMENTAL

I. Air Quality

Many of the stakeholders that WSDOT spoke with were concerned about the effect truck parking has on air quality in their communities. Trucks often idle while parked in order to provide drivers with basic needs, such as air conditioning on a hot day. Some outreach participants believed trucks often idle unnecessarily. Idling trucks release greenhouse gasses as well as pollutants that have adverse effects of the health of both the truck driver and community members near common truck parking sites. With the upgrades made to trucks in recent years, one WSDOT roundtable participant noted, truck emissions are much lower than they used to be. Nonetheless, air pollution remains a concern associated with truck parking.

Federal and state agencies set air quality standards for outdoor to prevent air pollution from reaching levels that harm human health. When an area does not meet an air quality standard, the state must develop a plan to clean up the air. The U.S. Environmental Protection Agency (EPA) sets national standards for six air pollutants called "criteria air pollutants". These federal standards are called National Ambient Air Quality Standards (NAAQS). States monitor air quality in different areas to find out if the areas are meeting the national air quality standards. There are both national and state standards for most criteria air pollutants. State standards must be at least as protective as federal standards, but can also be more stringent. Areas are then designated as either attainment (meeting and maintaining a standard), nonattainment (not meeting a standard), or unclassifiable (not enough information to classify).

Washington does not have any areas designated nonattainment for a federal health-based air quality standard. Tacoma-Pierce County was re-designated to attainment in March 2015 and is in maintenance status for the 2006 daily $PM_{2.5}$ (particulate matter) standard. There are other areas in Washington that have maintenance plans for criteria air pollutants.[99] Unless exempted by federal and/or state law, transportation projects need

[99] http://www.ecy.wa.gov/programs/air/sips/designations/maintenance_areas.htm

to be assessed for air quality effects when they are within carbon monoxide (CO) and $PM_{2.5}$ and PM_{10} nonattainment or maintenance areas.

Diesel Emissions

Heavy-duty trucks are the greatest contributors to diesel emissions in Washington, with about 29 percent of diesel emissions coming from trucks.[100] More than 95 percent of all heavy-duty trucks are diesel-powered.[101] Emissions from diesel vehicles are a concern for communities due to health risks. Diesel exhaust contains several regulated and unregulated air pollutants. Diesel $PM_{2.5}$ poses the greatest risk from exhaust due to its toxicity and because it can be breathed deeply into the lungs and pass directly to the bloodstream. Diesel exhaust puts people at risk for respiratory disease and worsens symptoms of other health problems. The Washington State Department of Ecology (Ecology) estimates that over four million people in Washington live or work very near highways and other major roads where they may be exposed to diesel exhaust. Freight diesel emissions can create more problems in urban areas where diesel emissions are more concentrated.[102]

The U.S. Department of Labor, Occupational Safety and Health Administration has not established a standard for diesel exhaust as a unique hazard, however exposures to various components of diesel exhaust are addressed in specific standards for general industry and shipyard employment.

In addition to harming human health, diesel emissions harm the environment. Diesel emissions contribute to ground-level ozone production, which damages vegetation. Emissions can also cause acid rain, which has a negative effect on soil, waterways, and wildlife. Greenhouse gas emissions from diesel engines contribute to climate change, which can affect air and water quality, weather patterns, sea levels, ecosystems and agriculture.[103]

The EPA has strengthened emission standards for heavy duty diesel trucks, buses and other vehicles. For example, acceptable levels of nitrogen oxide emissions decreased from 6.0 g/bhp-h (grams per brake horsepower-hour) to the current standard of 0.20 g/bhp-h.[104] More than 37 percent of diesel powered medium and heavy duty commercial trucks in the U.S. now have clean diesel engines, year 2007 or newer.[105] In 2000, heavy trucks emitted an average of 24.83 grams of NOx pollutants per mile; in 2015, that number had dropped to 9.15 grams.[106] In spite of this, due to the increase in truck freight movement, overall greenhouse gas emissions from trucks have been increasing. Between 1990 and 2013, greenhouse gas emissions from trucks increased by 76.4 percent.[107] It is therefore essential that efforts continue to support reductions in diesel emissions and multimodal modes of freight transportation. The EPA estimates 3 to 4 percent of truck emissions come from idling alone; therefore, idle reduction technologies could be key in helping reduce the environmental effect of truck parking.[108] Some cities have laws that forbid truck idling. For example, Spokane prohibits idling in the central business district in order to reduce carbon monoxide concentrations. Trucks are not authorized to idle for the purpose of operating heating devices, radios or any devices unnecessary for the safe operation of the vehicle.[109] Such laws are passed to reduce environmental effect, but without alternative power options, they can prevent drivers from utilizing necessary comforts for rest, or simply relocate the idling trucks to other locations.

[100] http://www.wsdot.wa.gov/NR/rdonlyres/92821FF3-1EB3-43D4-AC13-6E1117FA24A7/0/FreightFactSheetFinalJan2007.pdf

[101] http://www.dieselforum.org/about-clean-diesel/trucking

[102] Freight Mobility Plan (page 63-64)

[103] https://www.epa.gov/cleandiesel/learn-about-clean-diesel

[104] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100O9ZZ.pdf

[105] http://www.dieselforum.org/about-clean-diesel/trucking

[106] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf (Table 6-11)

[107] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf (Table 6-16)

[108] http://www.dot.state.pa.us/public/pdf/STCTAC/TAC/Reports/Truck%20Parking%20in%20Pennsylvania%20-%20December%202007%20-%20Final%20Report.pdf (page 31)

[109] https://my.spokanecity.org/smc/

Mitigation Efforts

The private sector accounts for the vast majority of truck ownership and diesel emissions. The majority of these truck fleets are small operations and therefore some have difficulty investing in technologies to reduce diesel emissions. Thus, efforts to reduce diesel emissions have involved collaboration between federal, state and local partners, as well as private organizations and the non-profit sector.

EPA's decades long effort to reduce criteria pollutants, air toxics and other harmful emissions from diesel fuel used in transportation has resulted in significant health and environmental benefits while advancing technology. These benefits are a result of a number of regulatory programs, including reducing sulfur levels in diesel fuel and voluntary programs including the National Clean Diesel Campaign (NCDC).[110]

On a state, federal and local level, many groups have taken action to reduce diesel emissions from trucks. Some of these efforts specifically address emissions from trucks idling while parked. For example, Ecology is working to help fleet managers reduce idling. They have also worked with partners (e.g., truck stop owners) to install idle reduction technologies.

Idle Reduction Technologies

Idling is the mode of diesel emissions most associated with truck parking. Idling is closely related to truck parking as drivers must idle while parked for driver utility. Idling, which consumes approximately 0.8 gallons of fuel per hour, is bad for the environment, costly for the driver and accelerates engine wear.[111] Long-duration truck idling is estimated to emit 11 million tons of carbon dioxide, 180,000 tons of NOx, and 5,000 tons of PM each year.[112] Several forms of idle reduction technologies are available, including direct-fired heaters, auxiliary power units (APUs), thermal storage systems, on-board batteries and truck electrified parking (TEP). These technologies have a range of use and acceptance by truck drivers. The cost of retrofit can be prohibitive to acquiring idle reduction technologies, as they can range in price from $1,400 to over $8,000. While the initial investment may be expensive, most idle reduction technologies break even cost-wise within two to three years due to diesel savings.

Two of the most commonly discussed forms of idle reduction for trucks are APUs and TEP. APUs are well-suited for trucks, especially long-haul rigs, as they provide all of the power needs for the vehicle, but they are also expensive and bulky. Nonetheless, APUs are a popular option for idle reduction in the trucking industry. Most APUs run on diesel, although battery powered options are also available.[113] APUs use less than 5 percent of the fuel that an idling engine does, significantly reducing emissions in trucks older than the 2010 models. TEP is another increasingly popular technology associated with truck parking. TEP allows trucks to plug into an electricity source, typically at a truck stop. TEP requires significant start-up costs and therefore a comprehensive network of electrified truck stops has not been realized yet. TEP may require drivers to adapt their trucks to use this technology, but also can be accessed by running

[110] https://www.epa.gov/cleandiesel/learn-about-clean-diesel

[111] http://www.afdc.energy.gov/uploads/publication/hdv_idling_2015.pdf

[112] https://www.epa.gov/verified-diesel-tech/learn-about-idling-reduction-technologies-irts-trucks#irts

[113] http://www.afdc.energy.gov/uploads/publication/hdv_idling_2015.pdf

an extension cord directly to the driver's in-cab devices. TEP increases demand for electricity, which can increase emissions in its own right. Regardless, these technologies represent important steps in combatting the threat of diesel emissions from idling trucks.[114]

Implementing idle reduction technology in the form of TEP is one step that Washington has taken toward reducing diesel emissions. Ecology has been investigating environmental concerns associated with trucks idling while parked and has worked with Shorepower, a TEP provider, as well as the EPA and Climate Trust, in order to install 76 TEP spaces at two truck stops in Washington.

In June of 2008, the federal government repealed the authorization for states to permit the electrification of idling reduction facilities at safety rest areas under H.R.1195.[115] The main opposition to providing electrification at rest areas was from the National Association of Truck Stop Operators (NATSO) because of the risk that it will lead to additional commercialization of public rest areas, which could result in hundreds of truck stops and travel plazas going out of business. Furthermore, the Washington State Constitution, Article XI, Section 14 restricts WSDOT's ability to have electrified parking installed by a contractor to sell electricity to the public for profit.[116]

II. Oil and Hazardous Material Spills

Another concern WSDOT heard during stakeholder outreach was the potential for oil and other hazardous material spills due to truck parking. Outreach participants said truck parking lots must be designed to mitigate any potential spills. Additionally, city representatives said that spill liability is one of the reasons cities are unwilling to provide off-street truck parking.

Oil spills, and the spills of other hazardous materials, are other environmental concerns related to truck parking. Spills have the potential to contaminate surrounding land and waterways, leading to environmental degradation and harmful effects on health and safety. Oil spills are a particular concern in undesignated parking areas where the location is not properly designed to handle runoff and spills from commercial vehicles. Ecology responds to incidents involving oil and hazardous materials that may harm Washington's environment, public health and safety. Ecology is the designated State-On-Scene Coordinator for oil spills to water. Response teams are based in Bellingham, Bellevue, Olympia, Vancouver, Yakima and Spokane to provide year-round, 24-hour a day response service.[117] The majority of hazardous material incidents occur on highways or in truck terminals, as most of these materials are transported by truck. The number of highway hazardous material incidents has been increasing since 1990, with 15,284 incidents in 2014.[118] Improving truck parking facilities may help reduce the number of truck crashes, which can cause hazardous spills. If drivers have access to safe parking, they may be less likely to drive fatigued and therefore less likely to get in a crash, thereby decreasing the likelihood and intensity of spills.

III. Noise

Washington state law sets noise emission standards for the operation of motor vehicles on public highways. Maximum sound level for any motor vehicle over 10,000 pounds is 80 A-weighted decibels (dBA), measured at 50 feet. Enforcement of this regulation is managed at the local level through ordinances. In spite of these ordinances, noise from trucks remains a concern in many communities, adding to the resistance of creating or expanding truck parking areas. According to *Environmental Health Perspectives*, noise pollution can have adverse effects on human health including disordered sleep

[114] NCTR Synthesis of Research on the use of Idle Reduction Technologies in Transit 2015

[115] https://democrats.senate.gov/2008/04/14/h-r-1195-the-safetea-lu-technical-corrections-act-of-2008/#.V_0EkPkrL4Y

[116] http://leg.wa.gov/LawsAndAgencyRules/Documents/12-2012-WAStateConstitution.pdf (page 41)

[117] http://www.ecy.wa.gov/programs/spills/spills.html

[118] http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/FF%26F_complete.pdf, page 78 (Table 6-3)

(which can lead to high blood pressure), stress and hearing loss. The EPA recommends no more than an average exposure of 70 dBA over a 24 hour period.[119] A diesel truck going 40 miles per hours releases about 80 dBA at 50 feet, which is two times as loud as 70 dBA. Exposure to 80 dBA over an eight-hour period has the potential to cause hearing damage.[120] Over the past several years, truck noise has reduced significantly due to upgraded engines, yet noise remains a community concern and is one of the reasons for pushback against truck parking facilities. Truck parking facilities can create increased truck traffic near the facility. Noise from increased traffic, along with noise from parked trucks idling, contribute to negative perceptions of truck parking facilities. These community concerns could be mitigated by locating truck parking facilities in industrial areas or along highways where high noise levels are more common. Idle reduction technologies could also help reduce the noise of idling trucks. Additionally, when designing a truck parking facility, a buffer zone, such as a line of trees, can help insulate communities from truck noise.

IV. Litter and Waste

Insufficient truck parking with proper amenities leads to pollution in the form of litter and human waste. Many unofficial parking locations lack basic amenities, such as restrooms and garbage cans, which contributes to this pollution. WSDOT maintenance workers have expressed frustration with this issue. Trucks park unofficially on state right of way and state owned facilities, such as weigh stations, and leave waste behind. Beyond human waste, it appears cattle manure is also becoming an issue. Truckers are known to use unofficial locations to spray off their livestock trucks, creating waste runoff, which can pollute nearby water sources. These issues with litter and waste can cause communities to associate negative connotations with trucks, making it difficult to garner community support for increased truck parking facilities.

E INFRASTRUCTURE CONSTRAINTS

I. Roadways and Loading Areas

During WSDOT's community engagement, participants stated streets, bridges and signage often do not accommodate trucks. Layout and design and sight distance are frequent concerns for truck drivers, who sit five to six feet higher than most other drivers. Likewise, truck parking facilities are not always designed to safely accommodate all kinds of trucks. Participants reported that oversize trucks in particular have a hard time with truck parking facilities where the designated spaces are too small or there is limited turning space. Drivers said striping and widening of parking spaces would be helpful. When parking to deliver loads in the city, it is common for loads from large trucks to be broken down into smaller trucks in order to navigate spatial and parking constraints. In terms of amenities, outreach participants considered restrooms and trash cans to be essential for any truck parking location.

II. Safety Rest Areas

Outreach participants reported many safety rest areas are at or over capacity, with truck parking spilling out to entrance- and exit-ramps and shoulders. Sometimes, when the truck parking is full, trucks will park in car or RV lots. The reverse also seems to be true; when the RV lots are full, RVs, trailers and cars will park in the truck parking zones. Trucks have damaged irrigation lines when parking in undesignated safety rest area locations, after having ignored the no parking signs. Smokey Point rest area on the Interstate 5 corridor, Washington's busiest rest area, is an example of a safety rest area with truck parking capacity concerns. Although outreach participants said Smokey Point is well-configured to accommodate trucks, demand frequently surpasses supply. Figures 12 and 13 show how the rest area can become overcrowded, resulting in unofficial parking, and how RVs

[119] http://ehp.niehs.nih.gov/1307272/

[120] http://www.industrialnoisecontrol.com/comparative-noise-examples.htm

Figure 12: Truck parked on exit ramp at safety rest area

Figure 13: Recreational Vehicles Parked in Truck Parking

and trailers encroach on truckers' parking space. Other safety rest areas with reported capacity issues include Bow Hill on Interstate 5, Winchester on Interstate 90, Prosser on Interstate 82 and Indian John on Interstate 90. Safety rest areas near Snoqualmie Pass get particularly overwhelmed when the pass closes due to winter weather.

III. Ports

Washington has several major ports where truck drivers pick up and deliver loads. Thus, ports create demand for parking in nearby and surrounding areas, which can lead to truck parking on industrial streets and, sometimes, in residential areas. In some locations, this has created backlash from neighboring communities. This is a national phenomenon; other ports on both the west and east coasts of the United States also experience these issues. Some outreach participants said ports should be required to provide truck parking as they generate large parking and detention demand. Ports in Washington are continuously working to address these issues, but there are limits to the extent to which ports can reduce the effects of trucks serving their facilities. Lack of space for additional parking or queuing areas, and/or the cost of increasing the supply of these facilities, affects the ability of ports to provide more parking and queuing capacity, prompting the use of technology and extended gate hours to better manage demand. For example, NWSA officials are in the process of implementing DrayQ, an app designed to enable truck drivers to avoid terminals with long on- and off-terminal queues. Legal issues and questions of liability can also prevent ports from providing parking, although the Port of Kalama leases land for parking and the NWSA currently allows overnight bob-tail parking at one of their Seattle terminals. Representatives from the ports noted their tenants should be responsible for providing parking, but are not required to do so by port authorities. Although outreach participants noted there is a demand for truck parking near the port before the gates open, in the past, when one container terminal in Seattle opened its gates two hours earlier (4 a.m.), the port did not find these additional hours were commonly used by drivers.

F. COMMUNICATION AND COORDINATION

I. Changing Technologies

Truck parking demand exceeds supply nationwide and in Washington. Building additional parking capacity can be expensive and difficult; therefore, both the public and private sector are using technology to help the trucking industry make better use of existing truck parking supply. Many technology enhancements

in truck parking focus on improved communication. Real-time parking availability systems, mobile device apps and connected vehicles help drivers to locate legal truck parking. For example, mobile device apps such as Park My Truck[121] and Trucker Path[122] help drivers locate parking. WSDOT operates several social media accounts that help drivers plan their routes and can alert them to road closures and other items that may affect parking choices. The NWSA uses a Freight Advanced Traveler Information System (FRATIS) to help drivers travelling to the ports plan their trip. Technology also involves changing infrastructure, such as installing idle reduction technologies to improve air quality and driver health while parked. Autonomous trucks are another emerging technology that has the potential to seriously affect parking demand. Overall, WSDOT's outreach participants felt that these technologies, while sometimes challenging to implement, will improve use of available parking options.

II. Diverse Responsibilities

There are many different entities in both the private and public sectors that contribute to truck parking's supply and demand. It therefore can be difficult to determine the roles and responsibilities of different parties when it comes to providing parking. The stakeholders contacted for this study held a variety of opinions on this matter, yet agreed that Washington needs a statewide approach to truck parking; no one stakeholder can solve the problem alone. Outreach participants said many partners have a responsibility to address truck parking, including ports, cities, metropolitan planning organizations and states. Others said that truck owners should be responsible for parking their trucks and paying for parking. In addition, stakeholders recommended public-private partnerships as a way to meet parking demand. When speaking of responsibility for parking facilities, outreach participants also noted that lot owners are held liable for safety and environmental contamination, which is one reason both public and private agencies are hesitant to provide truck parking. For more information on the entities with roles and responsibilities related to truck parking, see Appendix A.

III. Policy Misalignment

WSDOT's community outreach determined that truck parking policies and laws often vary between states, and even between cities, leaving drivers unsure of what their options for parking are when they cross state or city limits. For example, some cities have passed ordinances banning truck parking within their borders, while others allow street parking. When one city bans parking, there can be negative side effects for neighboring cities, as trucks get pushed from parking in one city to the other.

Outreach participants were also concerned about hours-of-service regulations. Hours-of-service requirements create demand for truck parking, which likely will be amplified with the impending switch to electronic logbooks in December 2017. Some drivers WSDOT spoke with opposed the ELD mandate. One saw the new regulations as an infringement on the right to privacy and was concerned about where the collected data goes. Another driver worried that the ELD mandate will make drivers less safe by reducing their control over their sleep schedules, potentially forcing drivers off of their natural sleep cycles and adding to the problem of fatigued driving. Drivers reported that a lack of truck parking contributes to fatigued driving and that they have experienced tired drivers posing safety concerns.

IV. Communication Needs

WSDOT's outreach discussions primarily addressed two types of communication—communicating parking information to truck drivers and communicating with the general public about truck parking needs. Participants identified a need to increase communication with drivers about parking options. Most drivers are responsible for locating their own parking. One driver noted that a shipper/receiver location in California provides drivers

[121] http://www.natso.com/parkmytruck
[122] https://truckerpath.com/

with local parking information and will call the driver when it is time to unload, which drivers found helpful. Truck drivers say they see value in real-time parking availability information and have found such systems in other states to be reliable and helpful. Participants said mobile apps are a preferable means of communicating real-time information and that message boards with parking information are less helpful because drivers often plan their stops hours in advance. Some drivers WSDOT spoke with already use apps to help them locate parking.

Outreach participants liked the idea of a printed map with truck parking locations as well, but worried that it may become quickly outdated. Current methods of communication, such as navigation systems and road signs, are difficult for truckers to use as they do not account for the sight distance issues and road restrictions associated with trucks. In terms of communicating with the public, the roundtable stakeholders stressed that public education regarding the reasons behind truck parking is essential to foster greater understanding and tolerance of trucks.

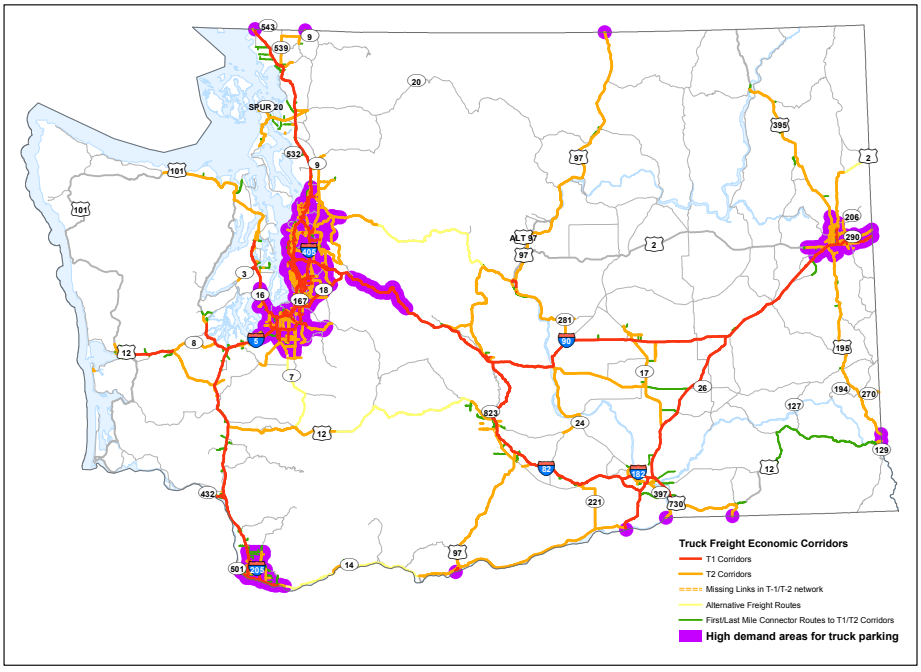
8 Opportunities

Based on the extensive outreach and engagement efforts described in chapter 6, WSDOT identified key corridors and locations with the most serious truck parking concerns. The top five corridors with truck parking concerns, as identified by survey respondents, are: Interstate 5, Interstate 405, Interstate 90, Interstate 82 and State Route 167. In addition, WSDOT identified key issues and challenges in three distinct areas of the state: urban/metro areas, international and state borders, and mountain passes and surrounding communities. These corridors and locations often overlap and, when they do, WSDOT observed the worst truck parking conditions. In many of these areas, trucks park on highway shoulders, exit and entrance ramps, and in communities, contributing to some of the issues described in chapter 7, including operational and safety concerns on the state highway system.

Interstate 5, Interstate 405, Interstate 90 and State Route 167 all serve major urban centers, including Seattle/Tacoma, Spokane and Vancouver, where truck parking is a frequent concern. Interstate 5, Interstate 90 and Interstate 82 cross international or state borders. Border towns on these corridors, such as Blaine, Vancouver and Spokane, all experience truck parking issues. Finally, communities on either side of Snoqualmie Pass, where Interstate 90 bisects the Cascade mountain range, express concerns with truck parking. North Bend and Ellensburg, on the west and east side of the pass respectively, both see disproportionate levels of trucks parking issues.

Washington is economically and geographically diverse; therefore, truck parking needs vary across the state. Truck parking is a statewide issue, but North Bend, Ellensburg, Blaine, Vancouver and central Puget Sound are areas of particular concern. Each have specific issues that need to be better researched and understood. Opportunities listed within this report can be implemented to address problems statewide, with particular focus on identified high-priority areas. The opportunities to address truck parking are categorized into three types: infrastructure; institutional and financial. Further actions and next steps are outlined in Chapter 9: Next Steps.

Figure 14: High demand areas for truck parking in Washington state



A. INFRASTRUCTURE OPPORTUNITIES

I. Technology Opportunities

As WSDOT considers new, low cost, sustainable solutions to truck parking concerns within a practical solutions framework,[123] operational and demand management strategies are being considered. This includes technology to improve truck parking availability, and to reduce truck parking effects on communities. Truck parking technology is developing rapidly in order to meet the growing demand with cost-effective and innovative responses. Technology allows truck drivers to make better use of existing truck parking facilities rather than expanding capacity. The technologies discussed below— idle reduction, real-time parking availability, mobile device apps, FRATIS, autonomous and connected trucks, and WSDOT's own online tools—all present opportunities for truck drivers to utilize parking more efficiently.

Real-Time Parking Availability

One potential solution to inadequate truck parking is to better match supply and demand using Intelligent Transportation System technologies. Surveys have found that knowing real-time parking availability is valuable to truck drivers[124] and that the majority would use this information to make parking decisions.[125] By providing real-time parking availability information, truck drivers are better able to locate safe parking in a fast and convenient manner.

Truck parking availability can be conveyed to drivers in a number of ways. Commonly explored methods include variable message signs, websites, in-cab communication systems and mobile device apps. The most common systems for tracking truck parking availability are count-in/count-out and presence detection. Count-in/count out technologies track availability by monitoring the total number of trucks entering and exiting the parking area. Light and laser systems, wireless magnetometers and video/camera detection are some of the technologies used. Presence detection uses a network of strategically placed, elevated cameras to determine which spaces are occupied. In-ground, space specific counting technologies are another option, but typically have a higher installation expense, and lack compatibility with gravel and/or unlined lots.

Many states, as well as FHWA and FMCSA, have been studying real-time truck parking systems. Florida,[126] Minnesota,[127] California,[128] Massachusetts,[129] Tennessee,[130] Michigan, and a coalition of Midwest states[131] have initiated pilot programs to test their feasibility. The University of Michigan recently published a study evaluating the effectiveness of the Michigan Department of Transportation pilot program, which provided real-time parking availability information at five rest areas and 10 private truck stops on the Interstate 94 corridor (see Appendix D for more detail).

Real-time technology has the potential to improve safety by helping tired drivers find a secure place to rest, reduce emissions by decreasing driving time spent looking for parking and provide financial benefits by improving delivery reliability and shipping time. At this time, real-time truck parking availability information systems are not available in Washington. As demand for truck parking continues to increase and budgets continue to feel constraints, options that optimize existing truck parking will become more important. Challenges with implementing real-time systems include set-up and maintenance costs, maintaining accurate availability

[123] http://www.wsdot.wa.gov/Projects/PracticalDesign/

[124] http://www.michigan.gov/documents/mdot/MDOT_Truck_Parking_Project_Report_528340_7.pdf (page 22)

[125] Commercial Vehicle Parking in California: Exploratory Evaluation of the Problem and Possible Technology-Based Solutions (2007), page 12

[126] http://fleetowner.com/driver-management-resource-center/tackling-truck-parking-sunshine-state-s-solution

[127] http://www.cts.umn.edu/research/featured/truckparking

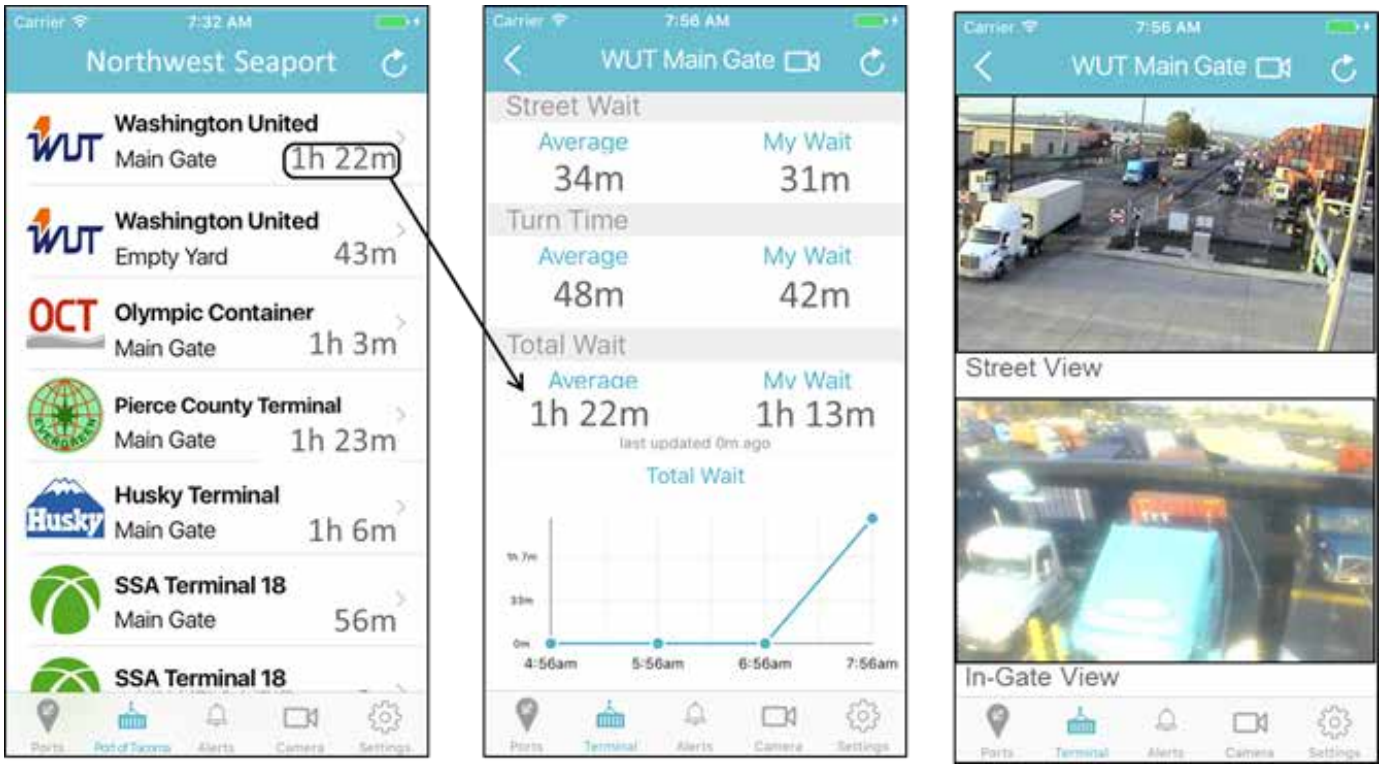
[128] http://tsrc.berkeley.edu/SmartTruckParkingForecastingParkingAvailabilityatTruckStops

[129] http://ntl.bts.gov/lib/43000/43000/43029/Chachick_Smart_Park.pdf

[130] http://www.smartparkingusa.com/2014-11-44_TNDOT_Flyer.v2.pdf

[131] https://cms.dot.gov/sites/dot.gov/files/docs/TIGER%202015%20Project%20Fact%20Sheets_0.pdf

Figure 15: Northwest Seaport Alliance DrayQ App



counts and communicating information to truck drivers. Interim options to real-time availability include producing static truck parking maps and/or signage and manually reporting truck parking availability. The Interstate 5 corridor is the busiest truck corridor in the state, and a shortage of convenient truck parking is documented. Additional research on truck parking availability systems implementation would help WSDOT determine the most appropriate technology and location for using such systems in Washington.

Freight Advanced Traveler Information System

FHWA and the Joint Intelligent Transportation Program Office initiated the FRATIS program to identify opportunities to provide advanced traveler information systems to the freight industry. A lack of freight travel information has negative effects on the efficient movement of freight transportation, planning of freight daily work activities, the environment of nearby communities, energy consumption and safety of the traveling public.[132] FRATIS has two main functions, known as applications, that integrate multiple data sources. The Freight-Specific Dynamic Travel Planning and Performance application includes traveler information, dynamic routing and performance monitoring elements. The Drayage Optimization application combines container load matching and freight information exchange systems to fully optimize drayage operations, thereby minimizing bobtails/dry runs and wasted miles, as well as spreading out truck arrivals at intermodal terminals throughout the day.[133]

FHWA's FRATIS program has funded several projects to test information technologies that help truck drivers plan their routes and parking. FRATIS has many applications including: integrating wait time data, traffic conditions, weather incidents and routing restrictions; enhancing communication between key freight players; providing

[132] http://ntl.bts.gov/lib/54000/54100/54104/12-065.pdf

[133] http://ntl.bts.gov/lib/57000/57000/57031/FHWA-JPO-16-225.pdf

real-time information for drivers; and optimizing truck movements between facilities.[134] The Port of Los Angeles is implementing FRATIS technology by testing systems that determine optimum load pick-up times and truck routes. The Port of Oakland has also implemented a system similar to FRATIS that is able to share street wait times, terminal turn times, aggregate wait times and wait time trends to drivers, dispatchers and ports. The Port of Oakland uses the DrayQ app to share this real-time information, which is determined using Bluetooth, Wi-Fi and GPS technology.[135]

Recognizing FRATIS as an opportunity to address challenges at Washington's ports, the Northwest Seaport Alliance, partially funded through the FRATIS program, is in the process of deploying a system to display wait times and turn times at the ports of Seattle and Tacoma. This data is available to truckers and dispatchers via the DrayQ mobile device app. The technology works by tracking truck wait and turn time at the ports via Bluetooth or Wi-Fi readers. The availability of real-time information should increase efficiency and reduce idling at the ports. Because drivers will be able to know how long wait times are at the terminals, this information could help them better plan their parking options in advance of departing for the terminals. WSDOT assisted in securing FRATIS funding for this project and is committed to partnership with the ports to ensure this system is beneficial to the freight industry.[136]

Idle Reduction

Truck drivers often must idle while parked and idle reduction technologies help to reduce diesel emissions from idling without affecting the needs of the driver. Chapter 7 discussed two major types of idle reduction technologies: auxiliary power units (APU) and truck electrified parking (TEP). Washington's departments of Ecology and Revenue have already taken action to make idle reduction technologies more accessible for truck and truck stop owners. In the future, where additional truck parking is proposed, Ecology will evaluate TEP for its feasibility and funding availability. Ecology will lead any efforts to determine the environmental benefit of TEP, which will assist in future project prioritization.

WSDOT, in conjunction with ODOT, has nominated the Interstate 5 corridor as a National Alternative Fuel Corridor. USDOT is designating plug-in electric vehicle charging and hydrogen, propane and natural gas fueling corridors in strategic locations to help improve mobility of alternative fuel vehicles. WSDOT has already taken several steps toward making the Interstate 5 corridor friendly to electrically charged vehicles,[137] including providing oversight in the installation of 56 DC fast charging stations from the Canadian border to southern Oregon. TEP is another vehicle technology that will be considered in the designation of the Alternative Fuel Corridors. As of December 2015, the Revised Code of Washington (RCW) 47.38.075 required the state to install electrical outlets to charge electric vehicles at each state-operated rest stop. Although this RCW does not extend to electrification for commercial vehicles, such regulations provide an opportunity for eventual TEP at safety rest areas.[138]

Mobile Device Apps

In recognition of the difficulties of implementing real-time systems, both the private and public sectors are responding to the immediate need for truck parking information with smartphone and tablet apps. ATRI identifies smartphones as the technology most used by drivers in their cabs. Therefore, using apps to transmit parking data is one method for improving truck parking information. For example, TravelCenters of America (TA) has a truck parking app that is updated every one to two hours

[134] https://www.fhwa.dot.gov/planning/freight_planning/talking_freight/july_2014/talkingfreight07_16_14sf.pdf

[135] http://www.portofoakland.com/press-releases/port-oakland-launches-smart-phone-apps-harbor-truckers/

[136] https://www.nwseaportalliance.com/news/10242016/nwsa-launch-mobile-apps-speed-cargo-flow-reduce-idling-related-air-emissions-and-save

[137] http://www.afdc.energy.gov/laws/11675

[138] https://app.leg.wa.gov/rcw/default.aspx?cite=47.38.075

Figure 16: WSDOT App

with availability at their truck stops.[139] Other truck stop chains also have apps, which typically help drivers locate their truck stops and allow drivers to reserve a parking spot.

The WSDOT app provides traffic and travel information to mobile devices and contains three sections of content most useful to truck drivers: traffic, mountain passes and border wait times. Under the traffic section, users can view locations of safety rest areas on the map, as well as information about each site. While the location and amenities available at each safety rest area is available on the app, truck parking availability is not currently listed.

Other apps exist on the market that present the opportunity for truck parking use. For example, the Waze app allows users to report on traffic conditions and in 2016 began integrating non-commercial parking data from INRIX.[140] This combination of crowd sourced information and real-time parking availability could work well in the commercial sector.

In October 2016, a new app became available called Park My Truck, to help drivers and dispatchers locate available parking. The app was created by the Truck Parking Leadership Initiative, which is comprised of the NATSO Foundation, NATSO Inc., the ATA, and ATRI. Park My Truck allows parking providers (both public and private) to report their parking availability and is free for all users.[141] While this technology relies on truck stop and rest area workers to share data, it is an important step toward making parking more accessible for truck drivers.

Autonomous and Connected Commercial Vehicles

Autonomous and connected vehicles are emerging technologies that present the opportunity to address truck parking issues. Technologically connected vehicles transmit and receive data to other equipped vehicles and roadside infrastructure (e.g., connected vehicles, vehicle-to-vehicle communication, vehicle to infrastructure communication). This technology can reduce the effects of traffic congestion and non-recurring incidents like adverse weather by: managing following speed and distance between vehicles; providing custom alerts and advisories; and providing location-based parking information. The Wyoming Department of Transportation (WYDOT) has a connected truck pilot program on the Interstate 80 corridor.[142] The trucks involved in WYDOT's program will be equipped with vehicle-to-vehicle and vehicle-to-infrastructure communication systems. The goal of the connected trucks pilot program is to allow drivers and dispatchers to make better freight decisions and to make drivers aware of downstream road conditions and parking options.

Autonomous vehicles are able to operate independently, and are not connected to other trucks or roadside infrastructure. In 2016, the first-ever commercial use of autonomous trucking occurred, when a truck moved a full load of canned beer on the Interstate Highway System in Colorado at full speed. This trip was facilitated with a $30,000 kit, capable of retrofitting any truck built after 2013. Although the trip required a driver for first and last mile portions, the highway portion allowed the driver to let the technology operate the truck.

These technologies have the potential to affect the demand for truck parking. Connected trucks, for example, help drivers better plan for and respond to events such as road closures and may

[139] http://www.ta-petro.com/trucksmart
[140] http://inrix.com/press/waze-parking/
[141] http://www.natso.com/parkmytruck
[142] http://ntl.bts.gov/lib/59000/59200/59237/FHWA-JPO-16-288.pdf

E-mail alerts:
WSDOT offers freight news and information via email alerts, including traffic alerts and construction updates. Sign up here.

even direct drivers to safe parking locations in such an event. This could reduce the prevalence of unofficial parking and improve safety. Autonomous trucks may reduce demand for truck parking because without a driver, there is no need for a truck to park for mandated rest breaks. Although current autonomous trucks still require a driver on board, it may be possible for the driver to complete his or her mandated rest in the sleeper berth while the truck keeps rolling. If autonomous or connected truck technology lowers the cost of shipping by truck, it could lead to an increase in the volume of freight shipped by truck. An increase in the number of trucks on the road could increase the demand for truck parking. While the driver of an autonomous truck may not need to stop for rest, there likely would still be the need for trucks to park while waiting for the opportunity to make their delivery.

There is an opportunity to invest in these technologies, especially as they develop and become more operationally and financially feasible. In the future, it is possible that connected vehicle and autonomous vehicle technology will converge, complimenting each other's strengths and weaknesses.

WSDOT Online and Electronic Tools

WSDOT uses many methods to communicate with drivers, including several tools to inform truck drivers about closures, traffic delays and other incidents. WSDOT reaches a large audience by utilizing many tools, including Facebook, Twitter, a WSDOT blog, a YouTube channel and a subscription email/text messaging service. The WSDOT website also provides region-specific travel alerts, including information about mountain pass conditions and closures, as well as traffic congestion. WSDOT regularly updates its social media tools in order to best respond to the needs of users and to take advantage of new opportunities to communicate with drivers.

WSDOT uses the Granicus (formerly GovDelivery) service to send topic-specific email messages (and in some cases text messages) to subscribers, including a freight-specific service called Freight Alerts, which currently has nearly 3,000 subscribers. WSDOT's Freight Alerts email service helps truck drivers identify and plan for traffic delays, construction projects and road closures. WSDOT regularly uses Freight Alerts to communicate with the trucking industry. In 2016, WSDOT used the system to communicate the temporary prohibition of truck parking at a safety rest area during maintenance work.

In addition, WSDOT send out Freight Alerts regarding the Interstate 5-Chamber Way emergency response and repair the summer of 2016. An oversized load struck the southbound portion of the overpass in late July. WSDOT used the Freight Alert tool to notify freight haulers that traffic was backed up for nearly 12 miles during the initial

incident—information that allowed truck drivers to alter routes or travel times to avoid the backup. Several days later, WSDOT used a Freight Alert to notify truck drivers that both directions of Interstate 5 traffic would be detoured overnight onto the exit and entrance ramps at Chamber Way while a contractor installed a temporary bridge. The use of the Freight Alert system—in conjunction with a traffic control plan, advanced notifications and light traffic volumes—helped keep backups to a minimum during this event.

II. Supply Expansion

Both public agencies and private businesses have an interest in ensuring sufficient truck parking in order to promote and safeguard public safety, the economy and the environment. Therefore, this study considers opportunities to expand parking capacity where demand exceeds supply. Basic needs of truck drivers, such as bathrooms and garbage disposal, should be considered in conjunction with truck parking expansion opportunities.

Opportunities in the Private Industry

There are opportunities for the private sector to expand truck parking capacity in locations where parking demand exceeds supply. The private sector has the opportunity to respond to truck parking demand and grow their own businesses in the form of commercial truck stops. Truck stop owners can expand existing truck stops and build new facilities, although such endeavors can be capital-intensive and face legal obstacles from local governments. Associations such as NATSO support truck stop owners in their endeavors. There is a need to better understand the roles and responsibilities of private truck stops in communities, including local government involvement in encouraging truck parking; this effort could reduce truck parking in less desirable locations, such as on local roads.

Truck parking also occurs on privately owned lots not necessarily intended for truck parking. This sort of unofficial parking indicates there is unmet parking demand in these areas, which could be met by converting vacant lots into truck parking locations. Other locations to consider for truck parking conversion are areas unsuitable for other kinds of development. For example, lots located under power lines or overpasses could have potential for truck parking. Not all vacant lots are suitable for conversion to truck parking, but the identification of these locations alone serves to inform both the private and public sector of opportunity areas where truck parking needs could be better addressed. Private businesses that wish to allow truck parking can encourage the use of their lots with signage or through an app. Businesses may even capitalize on truck parking demand by charging for truck parking. Shippers and receivers, whose businesses are reliant upon trucks can begin to address the truck parking shortage by providing parking for drivers for their own company. If possible, shippers and receivers could consider providing parking for outside company drivers for free or for a fee.

Safety Rest Areas

WSDOT provides truck parking at safety rest areas but there is a need to expand the capacity. WSDOT has conducted a preliminary assessment of each safety rest area based on its potential for expanded truck parking. WSDOT then cross-referenced this potential with the priority level of expansion based on demand indicated in an online survey. Although additional assessment and scoping is needed, the preliminary analysis shows that the following safety rest areas have high potential for truck parking expansion (parking expansion is physically feasible) and high priority for expansion:

- Smokey Point Northbound and Southbound (Interstate 5)
- Indian John Hill Eastbound (Interstate 90)
- Ryegrass Eastbound (Interstate 90)
- Sprague Lake Westbound (Interstate 90)

WSDOT has experienced pushback from communities when considering expanding truck parking at safety rest areas. To overcome this issue, WSDOT

has considered locating safety rest areas in the median of major highways, separated from city streets and neighborhoods. This approach could alleviate community pushback, but would require spatial and geographical considerations such as left lane entrance and exit ramps, or bridges over or under the highway. Nonetheless, medians offer an opportunity to develop new parking capacity with reduced effect on local communities.

When WSDOT plans major site or building upgrades to a safety rest area, the feasibility of adding truck parking also is evaluated. At most safety rest areas, there is not enough land to expand truck parking. If WSDOT is to pursue expanded truck parking, low-cost expansion opportunities are needed, or additional real estate may need to be purchased. Truck electrified parking is currently not allowed at safety rest areas, however the 2016 designation of Interstate 5 as a National Alternative Fuel Corridor creates opportunity for the electrification of rest areas in order to reduce emissions. This opportunity could forge a path towards truck usage of rest area electrification as well. Because the limits on commercialization of safety rest areas do not apply to non-Interstate facilities, there is an opportunity to explore electrification options at rest areas on state routes, including amending state law to allow for idle-reduction truck parking systems to be implemented. This could be an opportunity for public-private partnerships as well.

Washington safety rest areas currently have an eight-hour parking limit while truck drivers must park for 10 hours to abide by their hours-of-service requirements. Changing state law to expand the safety rest area parking limit to 10 hours would allow truck drivers to comply with the federal hours-of-service requirements. Additionally, enforcement of this law could be clarified by placing signs at safety rest areas stating truck drivers could park for 10-hour rest breaks. There is also an opportunity to implement real-time truck parking availability systems at safety rest areas in order to direct drivers to legal parking options.

There is a need to update data regarding demand at safety rest areas in Washington state. Previous WSDOT work from 2005 predicted that without added truck parking capacity, demand on all study corridor segments and the majority of safety rest areas will exceed capacity by the year 2030. Since 2005, truck parking demand has changed considerably, and additional research is needed to determine the effect on safety rest area use. WSDOT is considering conducting vehicle classification counts to better understand usage and demand. Updated demand information from field visits to safety rest areas would help determine how demand has changed in the last eleven years.

Weigh Stations

The Washington State Patrol does not currently allow for truck parking at most weigh stations beyond what is necessary to weigh and inspect the trucks; however, trucks still often park at weigh stations for longer periods of time. WSP generally allows this practice due to the lack of truck parking supply, so long as the weigh station is closed

There is an opportunity to legalize parking at weigh stations so that drivers can take their 10-hour rest break. Weigh stations could allow trucks to park when enforcement activities are not occurring; this would allow for otherwise unused space to be used for parking. Open weigh stations could also provide space for parking, so long as an adequate number of parking stalls remain available for inspection purposes. Legalizing parking at weigh stations would clarify drivers' parking options and provide a greater supply of official parking spots. New weigh stations can be designed to include truck parking; sites should be strategically located to create the most benefit. One such site under consideration is near North Bend, a key area of concern for truck parking.

Increased communication between WSDOT and WSP will help improve understanding of truck parking needs at weigh station facilities. A weigh station study, currently underway, will assist WSDOT and WSP in identifying opportunities for improving truck parking. WSDOT worked in

collaboration with WSP to analyze truck parking opportunities at weigh stations. Any changes to truck parking policies at weigh stations would need to be clearly communicated to truck drivers and officers so that enforcement is consistent. Outreach will help drivers understand and follow new policies without the fear of being cited while parked at weigh stations.

WSDOT Surplus Real Estate

In addition to safety rest areas and weigh stations owned by WSDOT, surplus WSDOT property could provide opportunities for additional truck parking. Additionally, as new highway projects are constructed, real estate is purchased that may provide truck parking opportunities. Creating legal parking for drivers on surplus WSDOT real estate could mitigate safety concerns and maintenance costs. Additional coordination with partners could create low-cost opportunities for truck parking adjacent to major truck routes at identified locations (e.g., bridges, chain-up areas, state-owned freight rail properties in Eastern Washington, excess property, surplus land, unconstructed right of way property, etc.). There may be an opportunity to form private/public partnerships to fund construction, maintenance and operations activities at any truck parking facilities developed on WSDOT right of way.

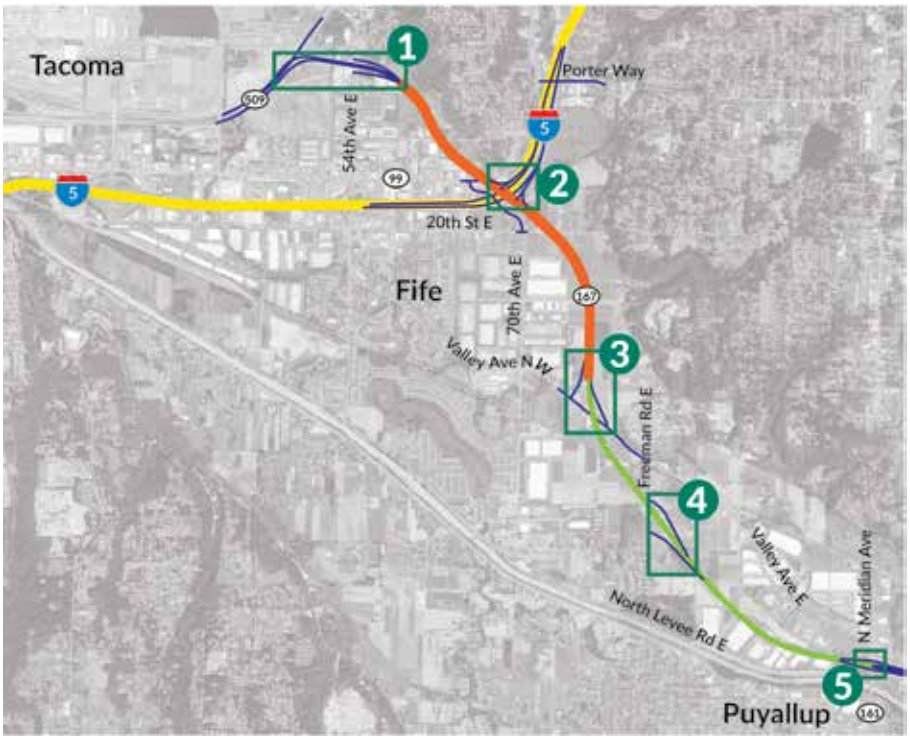
Elevated roadways and bridges provide opportunity for developing truck parking underneath these structures. Many of the larger sites are typically located near major truck routes, and often in urban areas. Similarly, truck parking opportunities can be explored at locations where the median of a divided highway has sufficient width to accommodate safe truck parking. For example, the 112th Street Park and Ride near Everett is located between the north and southbound lanes of Interstate 5, where there is sufficient space for a parking facility. There are challenges to developing truck parking on WSDOT right of way, including: access to these sites from local roads, established homeless camps and earthquake safety. To identify the most ideal locations of these opportunities, additional analysis is needed.

WSDOT currently owns unused real estate along the Palouse River and Coulee City (PCC) rail system. Three properties on the PCC have been identified with potential for truck parking, which includes property near State Route 902, U.S. 2 and U.S. 195. Both U.S. 2 and U.S. 195 are identified as high volume freight routes in Washington. These properties would need improvement work before being able to accommodate trucks.

As WSDOT continues to develop highway projects on major truck routes, additional land can be purchased and set aside for truck parking. WSDOT's Gateway project[143] on state routes 167 and 509, and other major projects that

[143] http://www.wsdot.wa.gov/Projects/Gateway/

Figure 17: Gateway Project on State Route 167



serve major freight activities (e.g., ports), are ideal opportunities, due to their proximity to major truck routes and to the Seattle and Tacoma ports. Additional coordination during the project development phases of these projects is needed, to ensure truck parking is fully considered. Partnerships with public and private entities could help implement parking in strategic locations on WSDOT's right of way.

In 2008, WSDOT developed a statewide inventory of all department-owned surplus property to identify parcels that are suitable for development of WSDOT facilities and those parcels that should be sold. Excluding operating right of way, the inventory contained over 25,000 acres of land and property rights. Of these 25,000 acres, WSDOT identified 643 parcels (equal to 3,626 acres) as suitable for development. WSDOT has determined that "development" includes future capital improvements for, or in support of, any agency facilities including but not limited to: roadway infrastructure or building projects; safety rest areas; truck parking areas; waste sites; and materials storage facilities. In addition, WSDOT determined that 266 parcels (equal to 2,209 acres) should be sold, starting with those with the highest value. At that time, WSDOT decided that data on real estate parcels would be improved in the Integrated Realty Information System (IRIS) database.

In IRIS, the property types identified with potential for truck parking are excess, surplus and unconstructed real estate. Excess property is land originally acquired for a highway purpose, but due to a change to highway alignment or design, is now outside of highway right of way. Surplus land is property purchased outside the right of way with no specified use. Unconstructed right of way is property acquired for a highway project that has not yet been funded for construction.

Through previous research and in roundtable discussions, WSDOT determined that a minimum of five acres is ideal for truck parking. This size allows for the spatial needs of large trucks. WSDOT has 365 parcels of at least five acres in the database for excess property, surplus land and unconstructed right of way. Additional analysis is needed to determine the adequacy of these parcels, including proximity to major truck routes, access, slope, environmental sensitivity, adjacent land uses, etc.

One of the challenges in identifying property suitable for truck parking is that WSDOT's real estate services activities are partially funded by the sale of excess property. This incentive to sell property is counter to developing truck parking, especially because improving the land to meet suitable conditions for truck parking creates additional costs. Additional coordination is needed to ensure WSDOT does not sell parcels most suitable for truck parking.

WSDOT has an identified process for disposing of surplus real estate that includes review from impacted functional areas of WSDOT. This process is detailed in the WSDOT right of way manual § 11-7, although truck parking usage is not considered.[144] As part of the process, the Regional Administrator must attest that the following statements are true before disposal can occur: a) the lands will not be needed for transportation purposes in the foreseeable future; b) the right of way being retained is adequate under present day standards for the transportation facility; c) the release will not adversely affect the facility or the traffic using it; d) the lands to be disposed of or relinquished are not suitable for retention to restore, preserve or improve the scenic beauty adjacent to the highway; e) the lands to be disposed of or relinquished are not suitable for inclusion into our wetlands inventory; f) the lands to be disposed of or relinquished are not needed for a park and ride lot, flyer stop or similar facility to accommodate high-occupancy vehicles; g) no hazardous material or highway waste is present on the site and any necessary cleanup has been

[144] http://www.wsdot.wa.gov/publications/manuals/fulltext/M26-01/ROW.pdf#page=2

completed; h) specific information regarding rights to be reserved; and, i) if interstate, NEPA (National Environmental Policy Act) documentation is signed and/or approved by Region Environmental Services. The review process does not currently include anyone from WSDOT's freight team. An improved review process might include freight expertise, and include truck parking consideration when parcels ideal for truck parking are being considered for disposal.

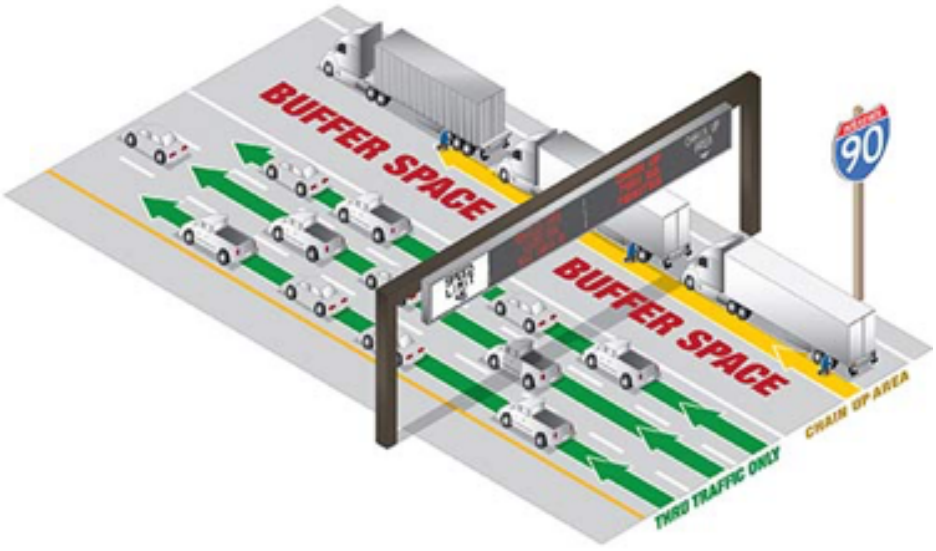
Chain-Up Areas

Chain-up areas at mountain passes are used for temporary truck parking while the driver installs traction devices. During winter weather on mountain passes, trucks over 10,000 pounds may be required to use traction tires. Installing chains on a truck in the snow can be challenging and time consuming, resulting in delay and backups in the travel lanes. In 2013, WSDOT expanded the length and width of the westbound chain-up area on Interstate 90 over Snoqualmie Pass.[145] Truck parking is allowed at these locations for 30 minutes only. When chains are not required on vehicles traversing the pass, these chain-up areas are not in use. This space creates an opportunity for additional truck parking, depending on weather, for longer-term parking. Additional coordination is needed to allow for truck parking in these areas, when chain requirements are not in effect.

Park and Ride Lots

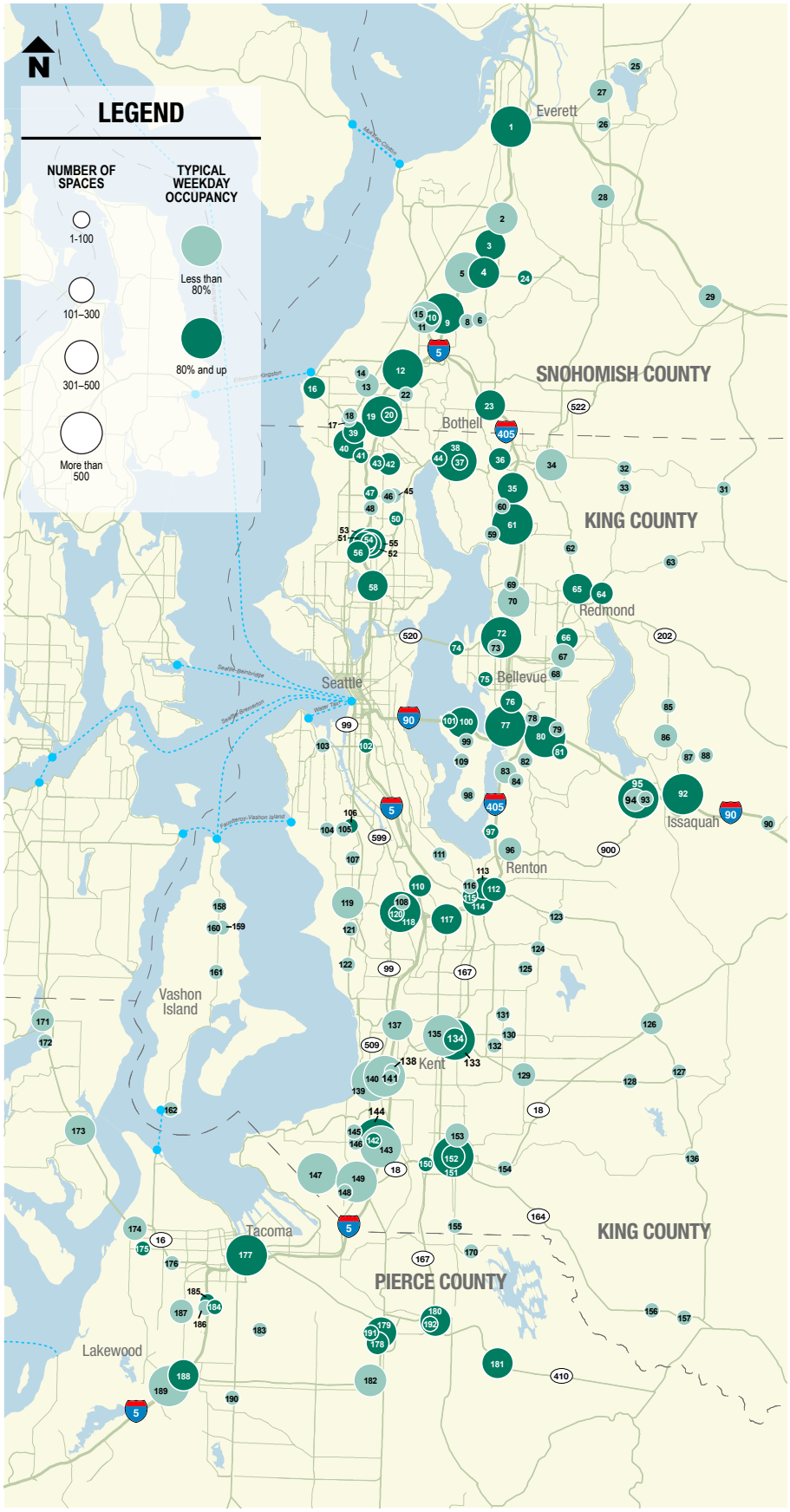
As communities continue to increase their demand for retail goods, and thus demand for freight trucks, they can examine many different opportunities to meet parking demand. For example, cities and counties can explore park and ride lots as an economical solution to the lack of truck parking capacity and as a way to mitigate trucks parking in unofficial locations or on city streets. There are over 350 park and ride locations within the state. The majority of park and ride lots are concentrated in the Puget Sound region, where truck parking facilities, such as truck stops and safety rest areas, are scarce. Park and ride lots are intended for use by public transit riders and ride-share users to encourage use of alternative transportation options. Although WSDOT does own some park and ride lot, most are operated by other agencies and jurisdictions. Park and ride lots are frequently located near, if not on, major highways. Generally, park and ride lots are used by commuters during the day, while the usage decreases significantly overnight, when many truck drivers take their 10-hour rest break.

Significant issues may be associated with the potential use of park and rides for truck parking. Possible issues include pavement deterioration, ingress and egress compatibility and environmental and safety concerns. Many park and rides are built using federal funds that were contingent upon a specific use; therefore, there may be legal ramifications associated with using park and rides for truck parking. In addition, truck drivers may find it difficult to complete their mandated 10-hour rest at park and ride lots as commuters will start filling spots early in the morning and may not leave until late in the evening. A few



[145] http://www.wsdot.wa.gov/News/2013/11/15_organizedchainupI90.htm

Figure 18: WSDOT Puget Sound Park and Ride Inventory 2016



drivers may even leave their car in the park and ride lot overnight as some lots allow for 48-hour parking.

Further research and coordination will be necessary in order to determine the feasibility of this truck parking opportunity. Underutilized park and ride lots, in particular, may be worth further research as such locations would minimize conflict between use by trucks and commuters. There are approximately 45 park and rides in the Puget Sound region that regularly are at or below 25 percent utilization. Additional analysis is needed to identify which, if any, of these park and rides are suitable for co-parking with trucks. Pilot programs initiated at underutilized park and rides near truck routes would allow for a better understanding of the feasibility of this truck parking opportunity. Additional coordination and outreach with park and ride lot owners, operators, and users will allow for a better understanding of the benefits and risks associated with co-locating these parking facilities.

Land Owned by Cities, Counties and Tribes

Local jurisdictions have the opportunity to allow on-street truck parking in areas with high demand, such as in areas zoned for commercial and industrial use; such parking can be encouraged with signage and with proximity to services and amenities. Truck parking lots can be provided to

discourage on-street parking, with either gravel or paved surfaces, and can be free to use or require a payment. There are many methods of payment available, including limiting access to the facility with a gate, using a for-fee permit system similar to state park system and others. Desirable sites for truck parking lots may be in industrial areas, especially difficult-to-develop sites such as brownfields. Providing truck parking in local communities is a business-friendly practice that can reduce pressure on areas where truck parking is less desirable, and can generate revenue to offset costs to develop and manage those sites. Additional coordination between local and state agencies can be useful in ensuring cities and counties are fully considering truck parking needs.

Ports

Ports are major generators of truck traffic and have numerous opportunities to help truck drivers locate safe parking. Ports can provide truck parking lots on-site, if they have room, or ask their tenants to do so. Parking for detention would limit backups to major access roadways; some terminals have on-terminal queuing areas for this purpose. Additional detention areas may be needed, to supplement other infrastructure and operational strategies. Parking for overnight use (i.e., local drayage trucks parked overnight, with private car parking during the day while the truck driver works) would limit truck parking in communities adjacent to ports. Ports can also purchase land off-site, within close proximity to their location, for truck parking. These parking options could be paid or unpaid. Ports also have the opportunity to help truck drivers fully utilize existing parking options through outreach and increased communication. Information regarding truck turn times at the port is another opportunity that allows for truck drivers to better plan their routes, decreasing the propensity for unofficial parking. Similarly, ports can develop reservation systems to reduce overall demand for parking. Finally, ports can work with their tenants to expand gate hours to keep drivers out of traffic, thus reducing congestion and demand for parking in outlying areas.

B. INSTITUTIONAL OPPORTUNITIES

I. Data and Research

Despite existing anecdotal and survey information, WSDOT currently lacks quantitative data to identify corridors and specific parking facilities where truck parking demand is greater than supply. This includes information on truck parking usage rates by location, seasonal variations in demand and truck traffic flows on major truck routes. Additional data collection and research would be useful in follow-on activities to inform decisions for WSDOT and truck parking partners. This information could help WSDOT identify locations where additional truck parking is needed, gain a better understanding of the reasons behind unofficial parking and determine if truck parking options are being utilized proportionally.

WSDOT identified the usage rates of several parking locations on Interstate 5 and Interstate 90 in previous studies, but these numbers are now outdated and need to be reassessed. Direct observation and research gathering and reporting on utilization (e.g., percent of facilities over capacity; percent of days over capacity) of truck parking facilities on Truck Freight Economic Corridors could help identify where parking is exceeding capacity statewide.

WSDOT is also interested in understanding the origins and destinations of trucks on corridors with high parking demand. ATRI is able to determine origins and destinations of their member companies' truck trips by analyzing GPS data from specific trucks. GPS data allows for a better understanding of freight flows and could be a useful tool for analyzing truck parking demand.

An analysis of truck trip generators (e.g., ports, businesses) would help WSDOT understand the spatial relationship between truck trip generators and parking demand to identify potential locations for future truck parking facilities. This effort could include a survey of personnel who work for truck trip generators.

Using research partnerships to collect truck parking data and conduct surveys could be beneficial. This information would allow WSDOT to better understand the generators of parking demand and the type of truck trips (e.g., short haul, long haul) using public and private truck parking facilities. A better understanding of truck parking demand data could give WSDOT a more quantitative perspective on truck parking demand in the state and allow for WSDOT to establish metrics that assess the capability of the state to meet current parking demand.

II. Coordination and Partnerships

Many concerns related to truck parking could benefit from increased coordination between partners and stakeholders. Partnerships within the private and public sectors, as well as public-private partnerships, would be valuable. Roundtable discussions allowing a variety of stakeholders discuss common truck parking issues, are the first step toward fostering greater understanding of truck parking needs and coordinating essential partnerships. For example, at WSDOT's roundtable discussions, participants noted that increasing delivery windows and shipper and receiver locations would help to reduce parking demand near shipper and receivers and near truck freight bottlenecks. Although some participants felt that the supply chain is not yet equipped to handle changes in delivery schedules, the ports of Seattle and Tacoma did extend their gate hours during the peak season, which drivers and other stakeholders felt was a step in the right direction toward addressing truck parking issues through partnerships and communication.

C. FINANCIAL OPPORTUNITIES

I. State and Local Funding

Safety Rest Area Funding

The WSDOT maintenance budget provides approximately $13 million each biennium for the safety rest area program; this budget covers small repairs, building maintenance, cleaning, supplies, water and wastewater systems, utility bills, landscaping, litter pick up and parking lot sweeping and plowing. Because funding is needed for upkeep, no funding is available for truck parking expansion.

The WSDOT capital improvement budget provides approximately $2.5 million each biennium for large improvement and additions to rest areas. Preservation and improvement needs are determined by condition assessments and emergent needs. The approximate $2.5 million biennial budget is prioritized by:

1. Legislated projects and actions
2. Public health and life safety
3. Accessibility (ADA legal mandates)
4. Imminent failure of key systems
5. Preservation of key systems
6. Operational improvements
7. Energy improvements

Additionally, the RV Sanitary Dump Stations fund provides approximately $1.5 million in funding each biennium. WSDOT maintains and operates RV dump stations at eight safety rest areas on the Interstate Highway System, in accordance with RCW 47.38.050. These dump stations are built for the use of private RV users. Commercial vehicle use of these dump stations is prohibited. The RV Account, established to fund this service, is funded through RV licensing taxes on license plate renewals. WSDOT has used this program to develop and expand several facilities. Many long-haul trucks have sleeper cabins with a portable toilet. Some of these truck drivers desire to use the RV dump stations. However, there is no opportunity under current statutory requirements to charge for commercial uses of these dump stations. The RV Sanitary Dump Stations fund was considered a model for funding truck parking; WSDOT considered developing a fund based on annual fees for trucks that would be directed towards truck parking expansion at safety rest areas. In the 2016 Truck Parking Survey, 42 percent of respondents were amenable to a parking fee, but not necessarily an annual fee.

Generating revenue to pay for parking

Cities and counties have the opportunity to finance their truck parking needs through parking revenues. Cities and counties can provide truck parking on-street or off-street and charge for the convenience of using such locations. Off-street truck parking areas can be secured, making them more valuable to drivers. States can also provide truck parking areas, either in the form of gravel or paved lots. Any parking on the Interstate Highway System needs to be paved. Ideal locations for truck parking are near freight generating facilities and ports. Such locations are valuable for drayage drivers who like to park near their work location. This will also prevent unofficial truck parking in residential neighborhoods and along highways.

One option for parking could be a secure lot with a transponder to open the gate. Annual or monthly rates can be charged for drivers to park and the revenue could be directed towards operations and maintenance of these facilities. Fees can be collected by requiring drivers to purchase tickets or tags, such as in the state park system. These fees can cover any costs of road maintenance or location security associated with truck parking, with additional revenue available to the city or county itself. Cities and counties have a vested interest in ensuring trucks are able to easily access parking in their jurisdiction, including annual, monthly or daily parking types. Local businesses rely on trucks to move their goods and deliver supplies. In addition, some of their citizens are likely professional truck drivers, who would benefit from having convenient parking options close to home. Precise locations of potential new parking locations and funding mechanisms are not determined. Additional conversations and research are needed to advance the conversation on generating revenue with truck parking.

Grants and Tax Incentives

The public sector can financially support truck parking endeavors by offering grants and tax incentives. For example, the Washington State Department of Revenue offered owners of truck stops and heavy-duty diesel trucks tax incentives for using auxiliary power sources to reduce air and noise pollution while parked. These incentives were effective from June of 2006 to July of 2015. The incentives offered truck stop owners a Business and Occupation tax deduction for providing non-metered auxiliary power to heavy-duty diesel trucks and an exemption from retail sales tax and use tax for the construction of pedestals at trucks stops and the equipment of deliver power to trucks. In addition, beginning in 2008, Ecology expanded Clean Diesel Grant eligibility to include privately owned diesel engines that serve a public function, such as port drayage trucks. The Clean Diesel Grant works to reduce diesel emissions by providing assistance to help fleet managers to reduce idling, use cleaner fuels, install equipment to clean up diesel exhaust (called “exhaust retrofits”) and replace older engines with newer, cleaner ones.

II. Federal Funding

FAST Act

The FAST Act (section 1116) established the National Highway Freight Program to improve the condition and performance of the National Highway Freight Network, which improves the efficient movement of freight and provides the foundation for the United States to compete in the global economy. Funds apportioned to Washington may be obligated for many types of freight projects, including truck parking facilities and real-time truck parking information systems.

The FAST Act (section 1109) established a Surface Transportation Block Grant program to provide flexible funding to address state and local transportation needs. Funds apportioned to Washington for this program may be obligated for truck parking facilities, including:

- Constructing safety rest areas that include parking for commercial motor vehicles
- Constructing commercial motor vehicle parking facilities adjacent to commercial truck stops and travel plazas

- Opening existing facilities to commercial motor vehicle parking, including inspection and weigh stations and park and ride facilities
- Promoting the availability of publicly or privately provided commercial motor vehicle parking using intelligent transportation systems and other means
- Constructing turnouts for commercial motor vehicles
- Making capital improvements to public commercial motor vehicle parking facilities currently closed on a seasonal basis to allow the facilities to remain open all year
- Improving the geometric design of interchanges to improve access to commercial motor vehicle parking facilities

The FAST Act (section 1105) established the Fostering Advancements in Shipping and Transportation for the Long-term Achievement of National Efficiencies (FASTLANE) grant program. Truck parking projects are eligible under the FASTLANE program on highways and in public or private ports and intermodal facilities. In 2016, the Florida Department of Transportation received a $10,7 million FASTLANE award to implement a real-time truck parking availability system.

The FAST Act (section 1114) continued the Congestion Mitigation Air Quality Improvement (CMAQ) Program and provided additional clarity and refinement. Areas currently and formerly in nonattainment or maintenance designation under the Federal Clean Air Act for the NAAQS related to ozone, carbon monoxide, particulate matter or other NAAQS, may be eligible for CMAQ funding.[146] CMAQ funding may be obligated, as well, to the most cost-effective projects to reduce emissions from port-related landside non-road or on-road equipment operated within the boundaries of a $PM_{2.5}$ nonattainment or attainment/ maintenance area. As of March 2015, Tacoma-Pierce County, which was the only nonattainment area in Washington, was upgraded to maintenance status for $PM_{2.5}$ levels.[147] A maintenance designation assures this area will maintain proper levels of $PM_{2.5}$. King and Pierce counties, parts of Thurston County, Wallula, and Yakima are in attainment and on maintenance plans for PM_{10}. King, Pierce, Snohomish, and Spokane counties, as well as the cities of Vancouver and Yakima, are in attainment and on maintenance plans for carbon monoxide. The development of new truck parking is not eligible, but electrification of existing truck parking is eligible for CMAQ funding.

The FAST Act (section 1106) reestablished the National Highway Performance Program (NHPP) for projects supporting progress toward the achievement of national performance goals for improving infrastructure condition, safety, mobility or freight movement on the National Highway System. Truck parking is included in these categories.

The FAST Act (section 1113) reestablished the Highway Safety Improvement Program (HSIP), which is guided by a data-driven Strategic Highway Safety Plan (SHSP) that includes a list of projects. Highway safety improvement project types include truck parking, if they are identified as a needed safety improvement in the SHSP.

The FAST Act (section 6004) establishes the advanced transportation and congestion management technologies deployment initiative, to provide grants for large-scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance and infrastructure return on investment. In particular, selection criteria will be developed that will improve mobility, reduce congestion and provide for more efficient and accessible transportation, with the focus on how the deployment of technology will collect, disseminate and use real-time traffic, transit, parking and other transportation-related information.

[146] http://www.ecy.wa.gov/programs/air/other/namaps/web_map_intro.htm

[147] http://www.ecy.wa.gov/programs/air/sips/designations/maintenance_areas.htm

TIGER Grants

Truck parking projects are eligible for funding under the federal TIGER grant program. A 2015 grant[148] was awarded to eight states and the Mid-American Association of State Transportation Officials to implement a regional truck parking information management system. This project uses existing ITS technology, and will be disseminated through smartphone applications, dynamic road signage, websites and parking facilities. This project should help truckers more quickly and reliably identify accurate and up-to-date information about the availability of safe truck parking.

DERA grants

Diesel Emissions Reduction Act grants fund programs for clean diesel projects that reduce emissions from vehicles, including medium and heavy-duty trucks. Thirty percent of DERA funding is allocated to states and territories, while seventy percent of funding is in the form of national competitive grants and rebates. Eligible projects include engine upgrades and verified idle reduction technologies, among others. Priority is given to projects that support locations vulnerable to poor air quality, such as truck stops and ports. Grants awarded in fiscal years 2012 to 2015 have included truck parking electrification.[149]

[148] https://cms.dot.gov/sites/dot.gov/files/docs/TIGER%202015%20Project%20Fact%20Sheets_0.pdf

[149] https://www.epa.gov/cleandiesel/clean-diesel-national-grants#dera2

9 Study Development and Next Steps

A. STUDY DEVELOPMENT

WSDOT developed this study with partnership from the trucking industry, including drivers, trucking company representatives and associations. In addition, WSDOT worked with federal, state and local partners who provided additional perspectives. Several partners, including WTA, FHWA and WSP, provided early review of portions of this draft study, to ensure accuracy and completeness. A review and comment period occurred in December 2016, which resulted in support and commendation for this effort; WSDOT received more than 200 comments and suggestions, which were all considered to prepare this final report. This truck parking challenge will require all partners and stakeholder to work together. No one entity can address this growing concern individually; strong partnerships will be crucial moving forward. Listed below are next steps to continue partnerships to address truck parking in Washington.

B. NEXT STEPS

It is clear that additional truck parking capacity is needed in areas where demand regularly surpasses supply. This study identifies the Interstate 5, Interstate 405 and Interstate 90 corridors in the Puget Sound area as the most difficult areas to find truck parking. In addition, roads that access major ports, international border crossings and mountain passes are also truck parking priorities. There are opportunities to maximize existing truck parking sites and also identify locations needing more parking—but both will require more evaluation. Innovative technologies also can help improve existing parking facility efficiency. Additional funding would help to address increasing truck parking demand. Outreach, including education and coordination, also is needed. Better coordination between partners, and a better understanding of the truck parking issues in our state, also will help to address this growing problem.

WSDOT has numerous opportunities to coordinate with partners in addressing truck parking issues, and several next steps have been developed working with those partners. Specific roles and responsibilities for involved stakeholders will be determined through additional coordination and communication. Developing partnerships with public and private entities will be essential for the successful implementation of these next steps. WSDOT will incorporate findings from this study into the 2017 update of the Washington State Freight System Plan.

Working with federal agencies, (e.g., Federal Highway Administration, Maritime Administration, U.S. Customs and Border Protection) WSDOT will enhance partnerships and continue to work to identify opportunities for truck parking, including:

- Identifying federal funding opportunities to address truck parking demand
- Continuing to participate in FHWA's National Coalition on Truck Parking
- Identifying research and survey opportunities with FHWA to further understand the emerging issues related to truck parking
- Identifying federal funding sources and opportunities to address truck parking

At the state level, WSDOT will expand relationships with

partners (e.g., Washington Public Ports Association, Freight Mobility Strategic Investment Board, Washington State Patrol, Washington State Department of Ecology) to address truck parking demand. Specifically, these partnerships are intended to identify opportunities on the state highway system for increasing truck parking supply, based on practical solutions. Opportunities for improving truck parking supply may include:

- Exploring state funding opportunities for truck parking
- Exploring opportunities for revising state and local policies that affect truck parking:
  - Extending the maximum use hours at safety rest areas to 10 hours for trucks
  - Legalizing the use of weigh stations and parking at international ports of entry for 10-hour truck parking
  - Legalizing the use of chain-up areas for 10-hour truck parking when chain-up requirements are not in effect
- Assessing and scoping of the potential for truck parking opportunities on WSDOT property, particularly on major truck routes and near major truck trip generators:
  - Safety rest areas
  - Weigh stations
  - Construction projects when developed
  - WSDOT surplus real estate properties before disposal
  - Park and ride lots
- Exploring opportunities for adding capacity of truck parking at public ports
- Assessing truck parking electrification opportunities.

Industry associations (e.g. WTA, OOIDA, NATSO), in collaboration with WSDOT, will also be important in identifying opportunities to improve truck parking. Partnerships with associations in the trucking industry will be developed with the purpose of identifying opportunities for increasing truck parking supply, and to better understand industry needs, which may include:

- Continuing conversations with truck drivers and companies to better understand truck parking issues and opportunities
- Incentivizing development or expansion of truck parking facilities
- Creating shared-use parking agreements with shippers/ receivers

In addition, WSDOT will continue to work with other identified partners (e.g., Metropolitan Planning Organizations/ Regional Transportation Planning Organizations, counties, cities, ports, tribes) to address specific concerns related to truck parking. Such partnerships are meant to identify opportunities for improving truck parking and queuing at non state-owned areas, such as:

- Expanding open gate times at major truck trip generators, like ports or large warehousing and distribution centers, for early and late deliveries
- Identifying specific locations for truck parking within port properties and in manufacturing, industrial and commercial centers
- Identifying steps local governments can take to encourage legal truck parking and discourage parking in residential areas
- Exploring opportunities for expanded application of technologies that enable drivers to better schedule and plan for truck trips and parking
- Exploring the development of appropriate municipal codes such as mandatory overnight parking provisions for businesses shipping and receiving freight by truck

Collaboration between WSDOT and the trucking industry (e.g., Washington Trucking Association, industry associations, truck stop owners) will help WSDOT to better understand emerging truck parking issues. Such collaborative activities may consist of:

- Improving the use of the Freight Alert email service

- Convening additional truck parking roundtable meetings
- Exploring opportunities and barriers to developing and expanding additional private truck stops
- Exploring application of new technologies, such as autonomous vehicles and truck platooning to assess effects on truck parking demand
- Developing issue-specific technical workgroups
- Establishing and updating key contacts and communication network

Outreach and engagement within communities (e.g. concerned citizens) to better understand community effects of truck parking will continue to be a priority for WSDOT. Community outreach is an important aspect of identifying opportunities to address broader symptoms of truck parking issues affecting local communities. Outreach and community engagement may include:

- Exploring opportunities and barriers to developing and expanding truck parking on public and private land
- Convening roundtable meetings for information gathering and public education
- Establishing key contacts and communication network
- Providing relevant information as appropriate

Finally, WSDOT will work with researchers and transportation system enterprises to better understand truck parking issues. More information is needed on the demand and supply factors for truck parking. There is a need to understand the key industries and commodity supply chains in order to better anticipate and plan for parking needs. Additional research and analysis on travel demand and system optimization will be helpful. Examples of research and business opportunities include:

- Conducting university research that can assist with understanding origin/destination information of truck trips and demand data on corridors with truck parking shortages
- Conducting research to better understand the connection/nexus between truck parking availability and safety
- Analyzing truck GPS data. The American Transportation Research Institute, working with the members of the National Trucking Association, has access to truck GPS data that could be useful in determining origin/destination information, and where trucks are regularly parked
- Analyzing the benefits of real-time truck parking availability systems

WSDOT will work with partners to develop and implement these next steps. WSDOT is committed to continuing to support existing WSDOT activities that support truck parking and to look for ways to improve conditions for truck parking availability in Washington.

Appendix A: Roles and Responsibilities

Truck parking is a responsibility shared between various public entities and private sector partners. These entities and partners work separately and in partnership to provide truck parking facilities and services across Washington state. They include those listed below, and many more.

A. TRUCKING INDUSTRY

Truck drivers are at the core of the trucking industry. There are approximately 3.5 million professional truck drivers in the United States, according to estimates by the American Trucking Association. Truck drivers typically work for a trucking company, a shipper/receiver or as an independent owner/operator. Often, truck drivers are responsible for locating their own parking. This can be a difficult feat as there are over 500,000 long-haul trucks in the U.S., and only 300,000 truck parking spaces.[150]

Freight carriers (trucking companies) that have storage for their fleets typically do not allow trucks from other companies to park at their locations. Larger companies may have agreements with truck stops to allow parking for their drivers or may reimburse their drivers for parking in paid lots. That being said, 90.6 percent of the trucking industry is made up of small business trucking companies that have six or fewer trucks.[151] Companies do not typically tell their drivers where to park, but rather allow drivers to find their own parking locations.

Shippers and receivers are responsible for generating truck trips onto the roadway systems in Washington. Shippers and receivers require the pick-up and delivery of goods, most of which is done via truck. Loading docks facilitate this purpose, but the majority of companies that ship and receive freight do not provide truck parking, although some have lots available for the exclusive use of their drivers.

Private truck stop owners provide the majority of truck parking spaces in Washington and nationwide. Private truck stops vary greatly in size and services, but tend to offer important amenities to drivers such as showers and food. Many surveys, including WSDOT's own Truck Parking Survey, have found drivers prefer private truck stops over all other parking options.

In addition to private truck stop owners, other private businesses are getting into the truck parking game by providing truck parking information and resources for locating truck parking. Several online databases exist listing truck parking locations and amenities.[152] In addition, companies providing technology for real-time truck parking availability systems are emerging and may become key players in the industry as truck parking demand increases.

B. TRUCKING AND RELATED INDUSTRY ASSOCIATIONS

The Owner-Operator Independent Drivers Association (OOIDA) represents the interests of independent owner-operators and professional drivers on

[150] NCTR Synthesis of Research on the Use of Idle Reduction Technologies in Transit 2015

[151] ATA Professional Truck Drivers Fact Sheet 2015

[152] E.g., Park My Truck, Truck Stop Pro, Love's On the Road, etc.

all issues that affect truckers. OOIDA advocates for the rights of professional truck drivers, including truck parking, to states, provincial and federal government agencies, legislatures, the courts and private businesses.

The American Trucking Association (ATA) represents over 35,000 trucking companies nationwide to support legislation beneficial to the trucking industry. They also conduct research with their American Transportation Research Institute (ATRI). This research informs federal and state decision-making by providing industry insight into trucking issues, including truck parking. ATRI also analyzes truck GPS data for states to better understand locational information.

The Washington Trucking Association (WTA) is a non-profit corporation that supports the trucking industry by supporting legislation beneficial to the trucking industry and giving voice to the trucking industry. The WTA works with government agencies, the legislature, and other organizations directly or indirectly related to trucking interests, including truck parking.

The National Association of Truck Stop Owners (NATSO) represents travel plaza and truck stop owners and operators through research, education, and public outreach. NATSO advances public policy goals of the truck stop and travel plaza industry. Its members provide the majority of truck parking in Washington state. NATSO partnered with ATA/ATRI to develop the Park My Truck app.

The Washington Public Ports Association (WPPA) promotes the interests of the port community through effective government relations, ongoing education and strong advocacy programs. WPPA strategically targets policies and investments that will help grow private sector businesses and jobs, strengthening the state's economy as a whole. WPPA represents the ports and acts on behalf on the ports on issues

C. FEDERAL AGENCIES

The Federal Highway Administration (FHWA) is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system, including truck parking. FHWA recognizes that truck parking shortages are a national safety concern. Among other truck parking projects,[153] in 2015, FHWA published Jason's Law Truck Parking Survey Results and Comparative Analysis.

FHWA formed the National Coalition on Truck Parking in August 2015 with the goal of enhancing Public, Private, and Shared Planning and Investments to respond to truck parking needs. With an interest in continuing the dialogue on national truck parking needs, the United States Department of Transportation (USDOT) formed a coalition of stakeholder organizations to help resolve truck parking problems. The coalition conducted four regional truck parking meetings aimed at identifying truck parking solutions around the nation. WSDOT participated in one such meeting. Topics of discussion focused on parking capacity expansion, funding, technology/data and coordination.

The Federal Motor Carrier Safety Administration (FMCSA) is an agency within the U.S. Department of Transportation that aims to prevent commercial motor vehicle-related fatalities and injuries. The FMCSA identifies truck parking as a tool to promote safety. Among other truck parking projects, the FMCSA has published a SmartPark Technology Demonstration Project report, looking at the feasibility of matching parking demand to supply using real-time truck parking information.[154]

D. WASHINGTON STATE AGENCIES

The Washington State Legislature creates new laws, changes existing laws and sets budgets for the state. The Transportation Committees of the House and

[153] http://www.ops.fhwa.dot.gov/freight/infrastructure/truck_parking/index.htm

[154] http://ntl.bts.gov/lib/51000/51400/51423/13-054-SmartPark-Demonstration-Project-508slim.pdf

Senate select freight projects to fund with state and federal funds, including projects that provide truck parking benefits. The Legislature has adopted Washington Administrative Code (WAC) 489-14-380, which defines hours-of-service (HOS) requirements for intrastate truck drivers.

The Washington State Department of Transportation (WSDOT) is responsible for building, maintaining and operating the state highway system, including many facilities used for truck parking. This includes roadsides and shoulders, exit and entrance ramps, weigh stations and safety rest areas. WSDOT coordinates freight planning activities—including truck parking—with many partners.

The Washington State Patrol (WSP) is responsible for truck weigh station operations, reviewing driver logs for hours-of-service violations and enforcing laws relating to illegally parked trucks on state property. WSP's Commercial Vehicle Enforcement Bureau ensures compliance of the commercial motor vehicle regulations to improve roadway safety.

The Washington State Freight Mobility Strategic Investment Board (FIMSIB) facilitates freight movement between and among local, national and international markets by facilitating partner coordination. FIMSIB is in charge of finding solutions that lessen the effect of the movement of freight on local communities, including truck parking.

Cities, counties and tribal governments are responsible for zoning, land use permitting, and creating and enforcing local laws. Some local governments encourage or allow truck parking; others do not. Urban and rural regional governments provide transportation coordination, which can include truck parking policies. Metropolitan Planning Organizations and Regional Transportation Planning Organizations develop long-range transportation plans and coordinate transportation planning within a region.

Ports are responsible for moving freight between landside transportation modes, such as trucking, and the waterways in Washington state. Ports generate truck parking demand near their facilities as trucks move much of the freight that arrives at and departs from their terminals. Some ports provide parking for trucks while others do not.

Appendix B: Truck Parking Activities at the National Level

A. JASON'S LAW TRUCK PARKING SURVEY (2015)[155]

Truck parking is a national problem. In 2015, the Federal Highway Administration (FHWA) published *Jason's Law Truck Parking Survey Results and Comparative Analysis*. FHWA administered this survey and report in response to Jason's Law, passed by the U.S. Congress in 2012, which brought national attention to the issue of truck driver safety and required the USDOT to survey each state's truck parking system. This analysis identified truck parking shortages as a national safety concern, due to inadequate supply of truck parking spaces relative to demand. This shortage can result in parking in unofficial locations or fatigued driving, directly affecting the safety of commercial drivers and other highway users.

WSDOT participated in FHWA's survey by providing information on truck parking in Washington. The survey found that most truck parking locations report being at full capacity during peak hours and unable to expand due to economic constraints and public opposition. The survey also found there is a need to understand the key industries and commodity supply chains in order to better anticipate and plan for parking needs. FHWA listed Washington as one of the states with the most severe truck parking challenges. For example, the survey ranked Washington 42nd out of 50 states in terms of public to private parking space ratio. Although Washington has a relatively high number of public truck parking spaces, spots at private facilities were more numerous and other states provided higher ratios of public truck parking. The survey also ranked Washington 44th in regards to total number of truck parking spaces per 100 thousand daily truck vehicle miles traveled and 38th for number of spaces per 100 miles on the National Highway System. This shows that most states offer more public and private truck parking spaces than Washington relative to truck traffic. The issues and needs identified in FHWA's report were the basis for developing this updated state truck parking study.

B. THE AMERICAN TRANSPORTATION RESEARCH INSTITUTE SURVEY (2016)[156]

The American Transportation Research Institute (ATRI), part of the American Trucking Association (ATA), administers an annual survey of trucking industry experts. In the 2016 survey results, respondents listed truck parking as the fourth issue with the highest level of concern. The report states that "the growing scarcity of available truck parking creates a dangerous situation for truck drivers who are often forced to drive beyond allowable hours-of-service rules or park in undesignated and, in many cases, unsafe locations". ATRI offers three strategies to combat truck parking issues: a) support and encourage investment in truck parking facilities, b) educate the public about safety consequences of inadequate parking and c) research the role and value of real-time parking availability and parking reservation systems.

In response to the federal Jason's Law survey, and ATRI's own research identifying truck parking as the most critical research need for the industry for 2015, ATRI is developing several truck parking research reports. The first of six reports, Managing Critical Truck Parking Tech Memo #1: Commercial Driver Perspectives on Truck Parking,[157] was released in 2015 and analyzes survey results. One survey question centered on a truck parking reservation system and the willingness to pay to reserve a parking space. The results showed that over half of respondents would be willing to pay a fee to reserve a parking space, particularly near larger metropolitan areas. Fees paid by trucking companies, not drivers, were found to be more acceptable.

[155] http://www.ops.fhwa.dot.gov/freight/infrastructure/truck_parking/jasons_law/truckparkingsurvey/es.htm

[156] http://atri-online.org/wp-content/uploads/2016/10/ATRI-2016-Top-Industry-Issues-10-2016.pdf

[157] http://atri-online.org/2015/09/21/managing-critical-truck-parking-tech-memo-1-commercial-driver-perspectives-on-truck-parking/

Appendix C: WSDOT's Truck Parking Activities

This study is a follow-on activity to WSDOT's previous truck parking activities from 2005 and 2008, and follows the recently published national Jason's Law truck parking survey. WSDOT's previous efforts are summarized below, along with WSDOT's truck parking activities since 2008, and are used as a basis for this plan to assess progress and to make advancements.

A. WSDOT TRUCK PARKING STUDY (2005)[158]

WSDOT's 2005 Truck Parking Study evaluated the adequacy of truck parking along the Interstate 5, Interstate 90 and Interstate 82 corridors, which are the state's primary freight corridors. The study assessed the use of safety rest areas, private truck stops and unofficial truck parking areas such as weigh stations, exit and entrance ramps, shoulders and chain-up/chain-down areas. The study determined that, on the identified corridors, safety rest areas were over capacity by 8 percent and truck stops were underutilized by 13 percent. The study identified specific rest areas and truck stops where capacity was an issue. Unofficial parking, where the truck driver parked in an undesignated area such as exit and entrance ramps, also occurred, but was not necessarily related to issues of overcapacity. Unofficial truck parking occurred even near rest areas and private truck stops with availability, leading to the conclusion that drivers park in unofficial locations due to other reasons, such as unfamiliarity with the area, a desire to maximize hours-of-service or tight parking configurations at public rest areas. The study also forecasted demand for the key freight corridors and predicted that truck parking demand for Interstate 5 and Interstate 82 would increase by 3.5 percent annually, and 4 percent annually for Interstate 90. Based on these numbers, with no additional truck parking added, Interstate 5 truck parking will be at 326 percent capacity, Interstate 90 West at 321 percent capacity and Interstate 90 East at 255 percent capacity by 2030. In order to combat this expected increase in demand for truck parking, the study identified key strategies to add capacity, including creating new truck parking at public rest areas through construction and reconfiguration, legalizing overnight truck parking at weigh stations, forming private-public partnerships to develop new truck stops near areas where rest areas are over capacity, implementing an information program for real-time parking availability and creating shared-use parking agreements with commercial lots and park and rides.

B. WSDOT TRUCK PARKING SURVEY SUMMARY (2008)[159]

In response to the 2005 Truck Parking Study, WSDOT's 2008 Truck Parking Survey focused on how truck drivers and trucking companies view the adequacy and availability of truck parking and services along primary freight corridors in Washington.

[158] http://www.wsdot.wa.gov/NR/rdonlyres/90A1F589-BB16-48E5-A958-6337018F2912/0/WSDOTTruckParkingStudyFinalReport.pdf

[159] http://www.wsdot.wa.gov/NR/rdonlyres/F0029FBD-55C5-4A3E-8485-A88153AB09BC/0/WSDOTTruckParkingSurveyApril2008_web.pdf

The survey found that truck stops and safety rest areas were overcrowded and too far apart, resulting in overflow parking in other locations. Ninety-five percent of drivers who responded to the survey indicated that overcrowding was a major barrier to parking. The survey identified the greatest need for parking in urban areas and at Snoqualmie Pass. Respondents indicated that Seattle, Tacoma and Federal Way —all of which are on the Interstate 5 corridor—are most in need of additional parking spaces. The survey also found that the majority of truck drivers and companies were unwilling to pay for parking and only about half of drivers were willing to use a parking reservation system. In addition, 62 percent of surveyed drivers reported they use some form of idle reduction technology, the most popular option being auxiliary power units/generators. Other comments from drivers indicated a dissatisfaction with current safety rest area lot designs, difficulty complying with hours-of-service and a need to expand chain-up areas along Snoqualmie Pass. In order to address these issues, the report offered several recommendations, including extending the eight-hour parking limit at rest areas to 10 hours, allocating separate truck parking at rest areas, assessing the willingness of local jurisdictions to provide/expand truck parking and expanding chain-up areas at Snoqualmie Pass.

C. WSDOT ACTIVITIES FROM 2008 TO 2016

Since 2008, truck traffic has increased on Washington's primary freight corridors, and on other roadways and therefore remains a concern for WSDOT. WSDOT has acted to enact some of the strategies identified in the 2005 and 2008 truck parking studies. The 2005 Truck Parking Study recommended increasing truck parking capacity at safety rest areas, which WSDOT did at Scatter Creek in 2009. As the 2008 Truck Parking Survey recommended, chain-up areas have been expanded for safety,[160] but these areas still do not allow for parking.[161] While WSDOT has made progress in these areas, several locations for truck parking have been limited since 2008, particularly recently. For example, WSDOT closed the Price Creek safety rest area on Interstate 90 in May 2015 due to the need to install a wildlife crossing.[162] The Washington State Patrol (WSP) and WSDOT closed the southbound truck weigh station on Interstate 5 in Federal Way in July 2016 due to safety concerns.

In response to the 2008 recommendations, WSDOT assessed the willingness of several jurisdictions to provide truck parking. Some cities have enacted their own ordinances restricting truck parking, while others allow for parking in designated areas. The private sector has undertaken other truck parking activities in Washington. While some truck stops have been closed since 2008, new truck parking facilities have been constructed as well. While these improvements on the part of WSDOT and the private sector are encouraging, they have not been sufficient to combat the increasing need for truck parking in the state.

WSDOT's Freight Alerts[163] email service helps truck drivers identify and plan for traffic and construction delays. WSDOT regularly uses Freight Alerts to communicate with the trucking industry. In 2016, WSDOT used the system to communicate the temporary prohibition of truck parking at a safety rest area while maintenance was underway. In addition, the system was rigorously tested in a 2015 road closure drill with multiple users to ensure it is a viable tool to help the trucking industry.

Lastly, the 2014 Washington State Freight Mobility Plan[164] identified truck parking as an issue, and developed a strategy to identify funding sources to add

[160] http://www.wsdot.wa.gov/Projects/I90/SnoqualmiePassEast/

[161] http://www.wsdot.wa.gov/News/2013/11/15_organizedchainupI90.htm

[162] https://www.wsdot.wa.gov/NR/rdonlyres/4EC220B2-A24B-4678-8BB9-6A0D3CE0798D/0/I90_Price_Creek_2014.pdf

[163] http://www.wsdot.wa.gov/Freight/default.htm

[164] https://www.wsdot.wa.gov/NR/rdonlyres/4AB1DCDE-5C29-4F08-B5E7697F432C34D7/0/2014WashingtonStateFreightMobilityPlan.pdf

truck parking capacity in high-demand locations along Truck Freight Economic Corridors. WSDOT's designation of the state's Truck Freight Economic Corridors in 2014 was essential to the development of this study. WSDOT used the Truck Freight Economic Corridors to identify where truck parking demand is likely to be highest in the state and to develop questions for WSDOT's 2016 Truck Parking Survey. The 2014 Freight Mobility Plan truck parking strategy acknowledges that interstate commerce is a state and national priority and recognizes that small communities located next to high-volume, long-haul truck corridors are not able to resolve multistate truck parking issues without collaboration and partnership. As WSDOT staff began to implement this strategy, it was clear an updated truck parking study was needed.

WSDOT conducted this 2016 Truck Parking Study as a result of the Jason's Law report and to build upon previous truck parking work at WSDOT. Based on what is known from the 2005 and 2008 reports, areas in greatest need of additional truck parking are along westbound Interstate 90 between North Bend and Seattle, along Interstate 5 both between Olympia and Everett, and the area serving the ports of Tacoma and Seattle. Drivers prioritized enhanced parking on Interstate 5, Interstate 90 and Interstate 82 over State Route 167 and at the ports, however the more days the driver spent in Washington, the more likely he or she was to support enhanced truck parking on State Route 167 and at the ports.[165] The purpose of this study was to verify these assumptions and to identify current issues in truck parking to be addressed. Strategies to address these issues will be identified in ongoing coordination activities, and included in the 2017 Freight System Plan update.

[165]Washington State Truck Parking Survey Summary Report 2008 (page 25)

Appendix D: Truck Parking Efforts in Other States

Many truck drivers in Washington travel across state lines, making truck parking efforts in other states very relevant to the work here. While each state has its own specific circumstances affecting truck parking, there are common issues across the country. To better understand how other states are approaching the issue, recent studies completed by nine states were reviewed, as well as a study conducted by a port and a Canadian province.

Although the studies reviewed varied in their focus, there were some common themes. Most states evaluated ways of providing real-time information about parking availability to drivers. Variable message signs along the highway were the most frequently preferred means of providing this information, often in concert with other tools. Multiple states also looked at increasing truck parking capacity by using existing facilities, such as weigh stations and park and rides. In addition, several states looked at providing financial incentives, like tax benefits or low-interest loans, to encourage the private sector to increase truck parking capacity.

A. VIRGINIA TRUCK PARKING STUDY (2015)[166]

Virginia's Department of Transportation conducted a truck parking survey and found that 70 percent of truck drivers report safety concerns for overnight parking. In response, Virginia recommended increased security at both private truck stops and public rest areas. Virginia's study emphasized the importance of forming public-private partnerships in order to address truck parking concerns. Some of the partnership ideas Virginia proposed included tax abatements and low-cost loans for the private sector to develop truck parking facilities; training and outreach to local municipalities to address public opinion of trucks; working with local officials, shippers, and receivers to create staging areas for trucks; and creating a multi-disciplinary task force to address truck parking. Virginia also considered alternative options for expanding capacity, such as utilizing park and ride lots and weigh stations, expanding existing parking facilities, and re-striping parking areas to optimize space.

B. MN/DOT TRUCK PARKING STUDY: PHASE II (2010)[167]

The Minnesota Department of Transportation (Mn/DOT) administered a truck parking study, following up on previous truck parking work. The study, published in 2010, determined opportunities for expanding truck parking across the state. The focus was on demand in urban areas, both in the state and nationally. The study assessed where truck parking capacity is of greatest concern and provided ideas for creating more parking such as building more stalls, creating truck-only parking areas, utilizing abandoned weigh stations and wide medians and providing better truck parking information. Mn/DOT discussed

[166] http://www.virginiadot.org/projects/resources/VirginiaTruckParkingStudy_FinalReport_July2015.pdf

[167] http://www.dot.state.mn.us/ofrw/PDF/truckparkingstudyphase2.pdf

the potential of providing real-time parking availability to truckers, referencing Caltrans IPark program and the Interstate 95 Corridor Coalition's initiative. Mn/DOT is currently following up on the 2010 study with a Truck Parking Availability Study, which will demonstrate a system for providing real-time parking availability using cameras that identify open spaces. Mn/DOT is testing this system on three rest areas and disseminating information to truckers using a website, in-cab messaging and variable message signs. Full results of this effort have not yet been released.

C. UTAH INTERSTATE 15 TRUCK PARKING STUDY (2012)[168]

The Utah Department of Transportation (UDOT conducted a trucking industry survey, which included an assessment of preferences related to real-time parking availability. The survey found that respondents preferred variable message display boards, road signs and paper maps as a means of communicating available parking drivers. Utah's paper truck parking map, which displays the location of truck parking facilities and number of parking spaces along key corridors, has reportedly been very popular with truck drivers. Similar to WSDOT's survey, Utah's respondents noted that, after 4 p.m., finding parking becomes increasingly difficult. Utah recommended a tolerant policy toward drivers parked unofficially due to hours-of-service requirements and establishing a Highway Rest Facility Committee to further address truck parking issues in the state.

D. LOW COST STRATEGIES TO INCREASE TRUCK PARKING IN WISCONSIN (2009)[169]

Wisconsin's study examined driver safety, noting that a significant percentage of drivers elect to park illegally (e.g., on highway exit and entrance ramps) in order to avoid illegal solicitations at unsecured lots. Like Utah's survey respondents, truckers in Wisconsin prefer to be notified about parking availability via variable road signs above other communication methods. The Wisconsin Department of Transportation (WisDOT) also identified the most important aspects of parking areas to be communicated to truckers, with the top results as location, amenities, space availability and time limits. In order to improve truck parking within the state, WisDOT recommended looking into using park and ride lots and weigh stations for parking. WisDOT also discussed changing city ordinances to increase delivery time windows, as well as supporting private truck stops with tax credits and/or incentives.

E. COLORADO TRUCK PARKING INFORMATION MANAGEMENT SYSTEM (2016)[170]

The Colorado Department of Transportation (CoDOT) explored the potential of using truck parking information management systems (TPIMS) in order to communicate real-time parking availability to drivers. CoDOT explained how TPIMS could reduce truck emissions by decreasing the amount of time spent looking for parking and reduce the number of trucks parked illegally, thus increasing safety. CoDOT plans to implement Intelligent Transportation System (ITS) technology through both state and federal funding. CoDOT will communicate real-time parking information to drivers via variable message signs, the CoDOT website, smartphone apps, and the 511 travel information system. CoDOT also developed a Truck Parking Guide, to assist drivers in locating long-term, emergency and chain-up parking.

[168] http://www.utahtruckparking.com/research-study.html

[169] http://wisconsindot.gov/documents2/research/08-28increasetruckparking-f.pdf

[170] https://www.codot.gov/programs/planning/documents/plans-projects-reports/projects/fastlane-applications/truck-parking-information.pdf

F. KANSAS STATEWIDE FREIGHT NETWORK TRUCK PARKING PLAN (2016)[171]

USDOT awarded the Mid America Association of State Transportation Officials (MAASTO) a 2015 federal TIGER grant to implement a regional truck parking information system. Kansas is leading the initiative, which involves eight states, and has included research on TPIMS in their truck parking plan. For example, a state survey found drivers' preferred method of parking information was smartphone apps, followed by variable signage. The Kansas Department of Transportation (KDOT) also found drivers prefer to receive parking information when they are approximately 20 miles away from the parking location. Additionally, KDOT recommended improving existing parking assets where the need is greatest, creating partnerships with other state agencies and developing pro-freight tax policies in order to best address truck parking needs in the state.

G. EVALUATION OF MDOT TRUCK PARKING INFORMATION AND MANAGEMENT SYSTEM (2016)[172]

In 2014, Michigan installed truck parking information management systems (TPIMS) technology in 15 public and private truck parking locations on Interstate 94, one of the state's busiest freight traffic corridors. The Michigan Department of Transportation (MDOT) now displays real-time parking availability at these locations to drivers via variable message boards, smartphone apps, in-cab displays and multiple websites. The University of Michigan Transportation Research Institute (UMTRI) conducted a review of the system to learn more about the effectiveness of the technology and drivers' opinions on the usability of the system. Based on a survey that UMTRI conducted of drivers on Interstate 94, UMTRI found that drivers find parking information systems valuable and believe use of such systems can reduce the time they spend looking for parking. Most drivers, even on Interstate 94, had no knowledge of parking availability before deciding to park, or based their decision to park based on past knowledge. Approximately one-third of respondents used the variable message signs to decide where to park and drivers indicated that dynamic signage was their preferred method of communication for parking availability. Surveyed drivers did not heavily use and did not prefer smartphone apps or websites. UMTRI was not able to establish whether or not TPIMS technology improved safety along Interstate 94 during the trial period, but previous MDOT studies have found a correlation between the number of parking related crashes and distance between rest areas. MDOT is a member of MAASTO and Interstate 94 is serving as a pilot program for the rest of the region as MAASTO plans to integrate TPIMS to other states using TIGER grant funds.

H. TRUCK PARKING IN PENNSYLVANIA (2007)[173]

Pennsylvania's truck parking study examined ways to reduce truck emissions by addressing the need for trucks to idle. Trucks often idle while parked in order to provide the driver with basic comforts and amenities. The Pennsylvania State Transportation Advisory Committee (TAC) looked at both

[171] https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burRail/Rail/Documents/Kansas_Statewide_Freight_Network_Truck_Parking_Plan_2015_2016.pdf

[172] http://www.michigan.gov/documents/mdot/MDOT_Truck_Parking_Project_Report_528340_7.pdf

[173] http://www.dot.state.pa.us/public/pdf/STCTAC/TAC/Reports/Truck%20Parking%20in%20Pennsylvania%20-%20December%202007%20-%20Final%20Report.pdf

stationary and mobile forms of idle reduction technologies. Drivers preferred mobile devices, called Auxiliary Power Units (APUs), to reduce emissions caused by idling. The TAC also noted that drivers sometimes elect to park on shoulders and ramps to avoid illegal activity at legal truck parking areas and to avoid damage that is caused by improper design and parking in rest areas and private truck stops. The study brought up an important point, which several other states echoed, that there is no real "champion" to address truck parking issues. Trucking industry stakeholders often shift responsibility from one agent to another. The TAC recommended creating private-public partnerships and a truck parking task force in order to address this issue.

I. NORTH JERSEY TRUCK REST STOP STUDY (2008)[174]

Many studies, including the North Jersey Transportation Planning Authority (North Jersey) truck rest stop study, mentioned a trade-off between illegal parking and fatigued drivers on the road. If no legal parking can be found, drivers must either park in illegal locations or risk going over their hours-of-service limits. North Jersey referenced a study done by the National Highway Traffic Safety Administration that indicated fatigue could be a factor in 30 to 40 percent of all heavy truck accidents. Though this percentage varies by study, it is clear that fatigued driving is a concern. North Jersey had one of the only studies that researched alternative fuel usage as a means of reducing truck emissions. Biodiesel, natural gas, and electricity were all options that North Jersey considered. North Jersey also recommended promoting private-public partnerships, advancing complementary land-use approaches to increase parking capacity, and providing financial incentives for the private sector to develop truck parking facilities.

J. PORT OF OAKLAND MARITIME COMPREHENSIVE TRUCK MANAGEMENT PROGRAM (2009)[175]

The Port of Oakland initiated a program to identify drayage trucks using the port, support regulations to reduce emissions, increase safety, improve operations and educate stakeholders. The port implemented a Port Registry program in order to promote compliance with emission regulations through low-cost financing and grants to retrofit or replace trucks. Oakland also has idling restrictions in place for trucks. As part of the environmental mitigation requirements for the redevelopment of the former Oakland Army Base, the city port were each required to allocate 15 acres of land to truck facilities. These facilities include truck parking and help to keep trucks out of neighborhoods and to continue the port's plan to improve traffic and congestion.

K. BRITISH COLUMBIA HIGHWAY REST AREA SURVEY REPORT (2016)[176]

The British Columbia Ministry of Transportation and Infrastructure commissioned a survey on the use of highway rest areas by commercial truck drivers, including which rest area services are important to them and their views on additional rest area locations and services. Of the 835 respondents, 82 percent were commercial truck drivers. Over 80 percent of respondents indicated they would like more or improved

[174] http://www.njtpa.org/planning/regional-studies/completed-studies/the-njtpa-north-jersey-truck-stop-study-refinement/njtpatruckreststopstudy/njtpaphaseitruckreststopreport

[175] http://www.portofoakland.com/files/pdf/maritime/ctmp/CTMP_final_090616.pdf

[176] http://www2.gov.bc.ca/assets/gov/driving-and-transportation/reports-and-reference/reports-and-studies/planning-strategy-economy/highway-rest-area-survey-report.pdf

rest areas, and 90 percent said they would support commercial services such as food and showers at rest areas. Eighty-two percent of respondents disagreed or strongly disagreed that there were sufficient rest areas on their routes, which could be why only 13 percent of drivers' stops were at rest areas. When asked what improvements would be suggested for rest areas, increased truck parking capacity topped the list with 76 percent support. Other popular upgrades were flush toilets and increased lighting. Preferred ideas for paid services at rest areas were convenience stores, showers, restaurants and fuel. The ministry also asked respondents to cite examples of exemplary public rest area facilities, to which many responded with safety rest areas along the Interstate 5 and Interstate 90 corridors in Washington. In response to this survey, the ministry committed $9 million (in Canadian dollars) to improve rest areas in British Columbia and to build a new rest area on Highway 97C.[177]

[177] https://news.gov.bc.ca/releases/2016TRAN0269-001721